



# MOTOROLA

## "SABER" SERIES "SECURENET" "Handie-Talkie" Portable Radios

403-512 MHz

### SPECIFICATIONS

GENERAL	TRANSMITTER	RECEIVER
<b>FREQUENCY RANGE:</b> 403-512MHz <b>BANDSPLITS:</b> 403-432MHz 440-470MHz 470-500MHz 490-512MHz  <b>POWER SUPPLY:</b> Rechargeable Nickel-Cadmium Battery or Primary Battery  <b>BATTERY VOLTAGE:</b> Nominal: 7.5Vdc Range: 6 to 9Vdc  <b>TEMPERATURE RANGE</b> Operating: -30°C to +60°C Storage: -40°C to +85°C  <b>DIMENSIONS (HXWxD)</b> Less Battery: 4.42"x2.94"x1.18" (112.27x74.67x29.97 mm) With Light-Capacity Battery: 6.68"x2.94"x1.18" (169.67x74.67x29.97 mm) With Medium-Capacity Battery: 7.56"x2.94"x1.18" (192.02x74.67x29.97 mm) With Ultra-High-Capacity Battery: (or Primary Battery) 8.32"x2.94"x1.18" (211.33x74.67x29.97 mm)  <b>WEIGHT</b> <b>NON-KEYPAD</b> Less Battery: 12.22 oz. (347 g) With Light-Capacity Battery: 18.63 oz. (529 g) With Medium-Capacity Battery: 23.87 oz. (678 g) With Ultra-High-Capacity Battery: 25.49 oz. (724 g)  <b>KEYPAD</b> Less Battery: 12.57 oz. (357 g) With Light-Capacity Battery: 18.98 oz. (539 g) With Medium-Capacity Battery: 24.23 oz. (688 g) With Ultra-High-Capacity Battery: 25.85 oz. (734 g)	<b>RF POWER OUTPUT</b> Low-Power Models: 1-2 Watts High-Power Models: 2-5 Watts  <b>FREQUENCY STABILITY</b> (-30°C to +60°C; +25°C REF): ±.0002%  <b>MODULATION:</b> Types 20K0F3E (±5kHz for 100% 20K0F1D modulation @ 1000Hz) 20K0F2D  <b>FM HUM AND NOISE</b> (COMPANION RECEIVER): -45dB  <b>SPURIOUS EMISSION</b> (CONDUCTED AND RADIATED) 1.0W: -67dBc 2.0W: -70dBc 5.0W: -74dBc  <b>AUDIO DISTORTION:</b> 3% Maximum  <b>AUDIO FREQUENCY RESPONSE:</b> +1,-3dB (6dB/OCTAVE PRE-EMPHASIS; 300-3000Hz)  <b>MAXIMUM FREQUENCY</b> <b>SEPARATION:</b> Full Bandsplit (NO DEGRADATION)	<b>SENSITIVITY</b> 20dBQ: 0.4uV Max. 12dB: 0.3uV Max. Squelch (Programmable): 0.25uV Max.  <b>USEABLE BANDWIDTH:</b> Adjacent channel: -75dB Fourth channel: -80dB  <b>INTERMODULATION:</b> -72dB  <b>FM HUM AND NOISE:</b> -40dB  <b>FREQUENCY STABILITY</b> (-30°C to +60°C; +25°C REF.): ±.0002%  <b>AUDIO SPL (AT 30 cm</b> <b>WITH RATED AUDIO):</b> Weighted, 300-3000Hz 90dB Nominal (Non-Submersible) 89dB Nominal (QXK Models)  <b>RATED AUDIO OUTPUT:</b> 500mW (At less than 5% distortion)  <b>CHANNEL SPACING:</b> 25kHz  <b>MAXIMUM FREQUENCY</b> <b>SEPARATION:</b> Full Bandsplit (NO DEGRADATION)
<b>SECURENET</b>		
<b>SCRAMBLE TYPE:</b> Digital <b>ENCRYPTION METHOD:</b> Multi-Register, Non-Linear Combiner <b>ENCRYPTION KEY INITIALIZATION:</b> Random <b>ENCRYPTION KEY GENERATION:</b> External, Hand-Held, Microprocessor-Controlled Key loader Volatile Electronic Memory One Continuously-Variable Slope Delta Modulation (CVSD) 12 Kilobits/Second  <b>KEY STORAGE:</b> <b>NUMBER OF KEYS PER RADIO:</b> <b>ANALOG-TO-DIGITAL CONVERSION:</b> <b>VOICE SAMPLE RATE:</b>		

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

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# Manual Scan

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I hope this service manual is of use to you. Motorola does not make this available as a PDF and all other available copies are of poor quality.

Each page is captured at 600 DPI, and as 24-bit color, 8-bit grayscale or black and white and at the proper page size, up to 11x34 inches in many cases. OCR has been preformed on the document, even on the large pages. The document is condensed into one single PDF with text overlay. You should be able to print the larger sheets on 11x17 or tile them onto 8.5x11 if needed.

Please do not charge for access to this, or put it on a pay-wall site. Please don't pay for access to any such sites, they are against the ethos of hacking, and it only encourages them to profit off the hard work of others which has been shared openly. Please don't change this/recompress it; this defeats the point of capturing this at high resolution.

If something is incorrect here, or unreadable please reach out; I likely have the original lossless compressed images. In the final PDF that's color or grayscale will be JPEG 2000 format with highest quality selected. B&W images will be compressed using CCITT Group 4. This is quite close to the source material, but there may be some artifacts due to lossy compression. If there's a choice between file size and image quality, image quality will win. It's 2021 and storage and bandwidth is cheap.

This was captured on a Canon DR-G2140 scanner which is ~ 7500 USD unit circa 2021. You may note some artifacts and lines in on the scans, these are due to scratches on the sensor glass, and are minor. The replacement glass is about 250 USD if you're feeling generous :-)

If you have a hard to find/out of print manual and would like to make it available please reach out, I may be able to scan and return it to you.

Thank you,

Bryan Fields, W9CR  
bryan@bryanfields.net

### MODEL CONFIGURATION

FACTORY I.D.	POWER LEVEL	FREQ.	SUBMERSIBLE	KEYPAD	DISPLAY
H34QXN7139AN	1W-2W	438-470MHz	No	None	None
H44QXN7139AN	2W-5W	403-512MHz	No	None	None
H34YXN7139AN	1W-2W	438-470MHz	Yes	None	None
H44YXN7139AN	2W-5W	403-512MHz	Yes	None	None
H34QXJ7139AN	1W-2W	438-470MHz	No	3x1	LCD
H44QXJ7139AN	2W-5W	403-512MHz	No	3x1	LCD
H34QXK7139AN	1W-2W	438-470MHz	No	3x5	LCD
H44QXK7139AN	2W-5W	403-512MHz	No	3x5	LCD

### FCC DESIGNATIONS

2-Watt Models.....AZ489FT4714

5-Watt Models.....AZ489FT4715

### SPECIALIZED TOOLS AND TEST EQUIPMENT

	SERVICE AIDS
NTN4720A	SECURENET Bypass Module
RPX-4665A	Field Modification Kit/RTX-4005A
RSX-4043A	Rotatorq Tool
RTK-4203A	Program/Test Cable
RTL-4224A	Battery Eliminator
RTL-4225A	Housing Eliminator
RTX-4005B	Portable Products Test Set
TKN8506A	Keyload Cable
0180370B85 thru B86	Ungar Table Fixtures
0180386A81	Micro-Tip Soldering Iron
0180386A82	Static Protection Kit
6680321B79	Phillips-Head Rotatorq Bit
6680334B48 thru B52	Ungar Service Heads
6680370B88	Frequency and On/Off Switch Spanner Nut Rotatorq Bit
6680370B89	Baseplate Spanner Nut Rotatorq Bit
6680370B90	Antenna Bushing Spanner Nut Rotatorq Bit
6680385A11	Module Extractor
6680387A59	Leadless Component Extractor
6680387A64	Heat Controller With Safety Stand
8407668M01	Display Extender Cable
	TEST EQUIPMENT
R-1053A	Dual-Trace Oscilloscope
R-2045D	Communications Systems Analyzer with Secure Voice Option
S-1339A	RF Millivoltmeter
S-1347D	Power Supply
RTL-4223A	Charger Tester
	FIELD PROGRAMMING EQUIPMENT
NTN-5375A	SECURENET Field Programmer Software on 3 1/2-inch Disk
NTN-5376A	SECURENET Field Programmer Software on 5 1/4-inch 360k Double - Density Disk
NTN-5377A	SECURENET Field Programmer Software on 1.2 Megabyte High- Density Disk
0180353A74	Radio Interface Box (RIB)
0180357A57	RIB Wall-Mounted Power Supply
3080369B71	Computer Interface Cable
68P81044C65	SABER Field Programmer User's Guide

### CURRENT DRAINS (SEE NOTE)

	SABER I	SABER I AND III
STANDBY	85	88
RECEIVE	215	218
H44 MODELS: 5-WATT	3300	3300
2-WATT	2100	2100
H34 MODELS: 2-WATT	1400	1400
1-WATT	1200	1200

**NOTE:** Drain specifications are in milliamperes at 7.5Vdc. These current drains apply to test mode, with the radio operating through the external antenna port. Current drains decrease in normal operation due to antenna switch drains and antenna loading.



**MOTOROLA INC.**

**MANUAL REVISION**

**for  
Manual No. 68P81045C75-O  
SABER™ SECURENET™ UHF  
Portable Radio Service Manual**

This revision outlines changes that have occurred since the printing of your manual. Use this information to supplement your manual. Installation of these changes in earlier equipment is not necessary except as recommended in Motorola Service and Repair Notes (SRN's).

**REVISION DETAILS**

<u>NO.</u>	<u>CHANGE AFFECTS</u>
1	EXISTING MAIN CIRCUIT BOARD COMPONENT LAYOUT DIAGRAMS
2	NEW 8405302U01 MAIN CIRCUIT BOARD COMPONENT LAYOUT DIAGRAMS

**CHANGES**

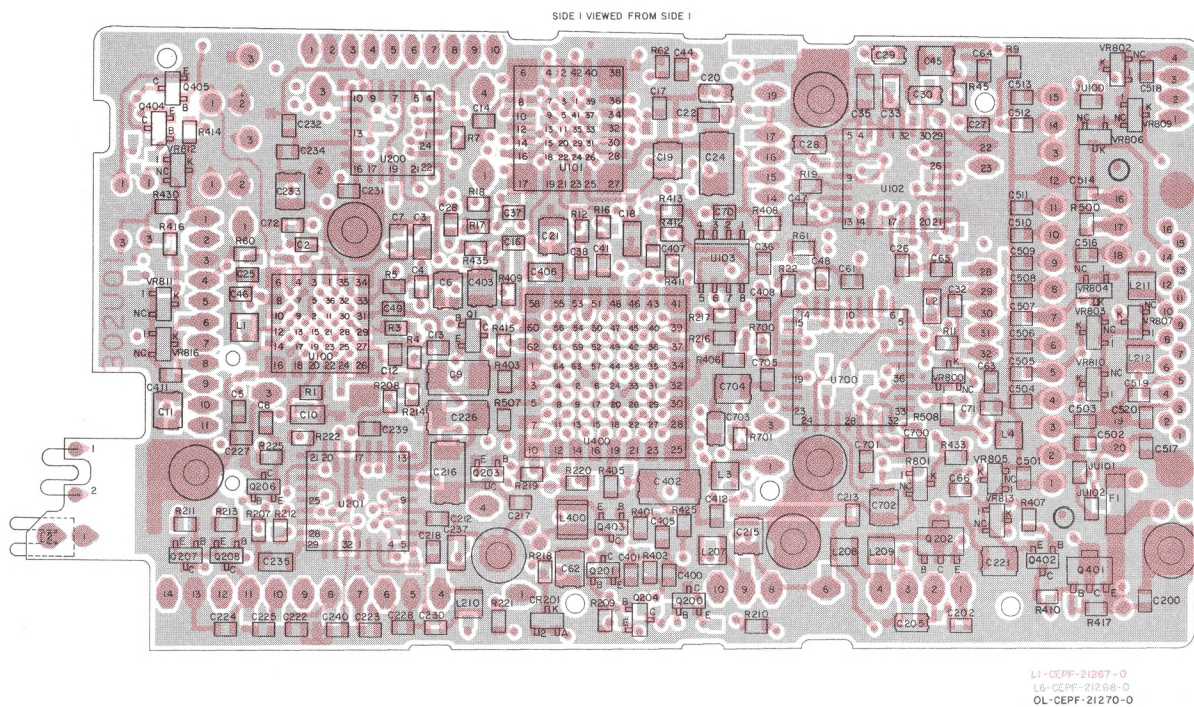
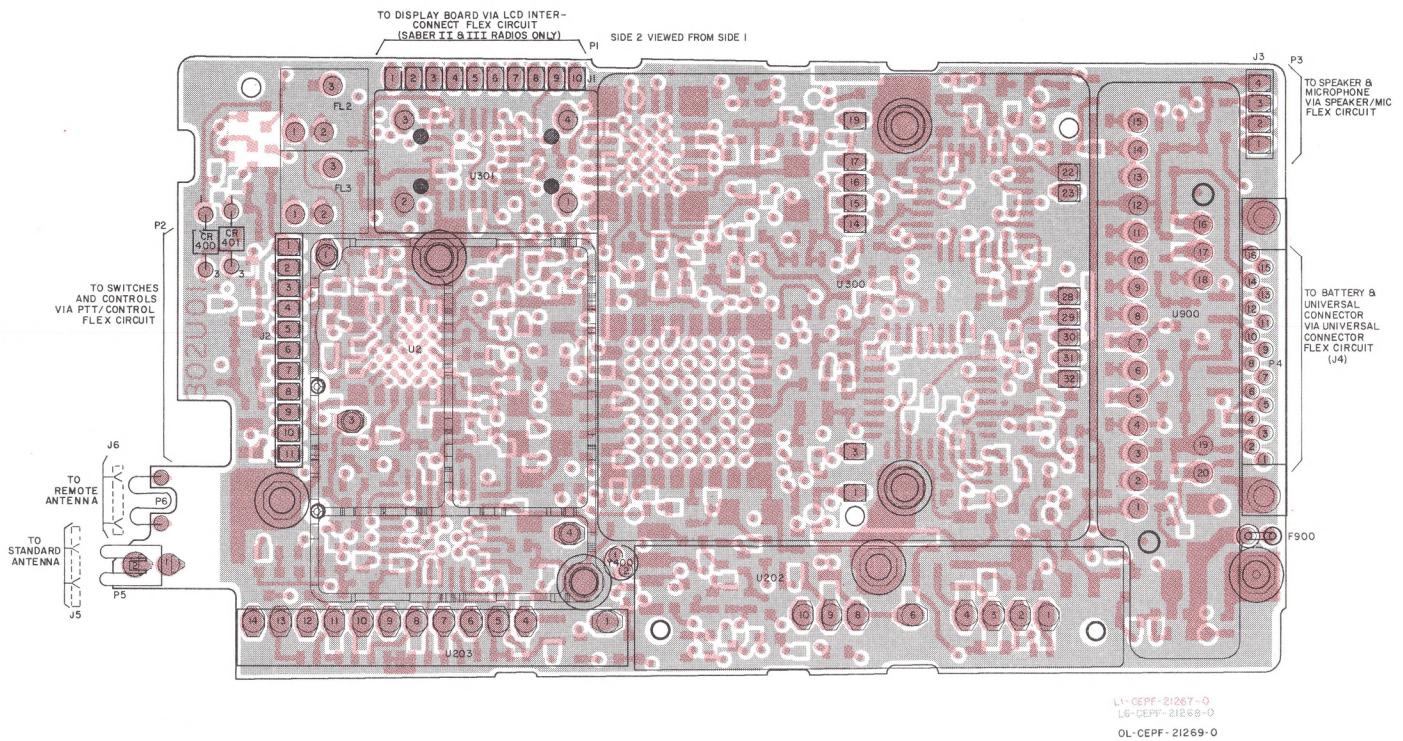
<u>NO.</u>	
1	Add the following above the existing Main Circuit Board Component Location Diagrams on pages 9 and 10:

**8405102R01 MAIN CIRCUIT BOARD**

- |   |   |
|---|---|
| 2 | Add the following new Component Layout Diagrams for the 8405302U01, Main Circuit Board: |
|---|---|



# 8405302U01 MAIN CIRCUIT BOARD





**MANUAL REVISION**  
for  
**Manual No. 68P81045C75-0**  
**SABER™ SECURENET™**  
**Handie-Talkie® Portable Radios**  
**407-512 MHz**

This information outlines changes that have occurred since the printing of your manual. Use this information to supplement your manual.

**REVISION DETAILS**

**NO. CHANGE AFFECTS**

1	Specifications
2	Model Configuration
3	Specialized Tools and Test Equipment
4	SECURENET® Radio Functional Tests
5	Electrical Parts List
6	SABER I, II, AND III Exploded View Parts List
7	SABER II AND SABER III Exploded View Parts List
8	SABER 2K AND SABER III Display Electrical Parts List
9	SABER I, II, AND III Exploded View Parts List
10	SABER II AND III Exploded View Parts List

**CHANGES**

**NO.**

**1** On the front cover, **SPECIFICATIONS**, change the following as indicated:

**BANDSPLITS:**           **GENERAL**  
407-433  
440-470  
460-490  
482-512 (LP Models)

**FREQUENCY STABILITY (-30°C to +60°C; +25°C REF)**   ±.0003%  
**TRANSMITTER**  
**RECEIVER**

**SENSITIVITY**  
20dBQ:           0.4uV  
12dBS:           0.3uV  
Squelch           Programmable

**USEABLE BANDWIDTH:** ±5kHz

**SELECTIVITY**  
Adjacent channel: -75dB  
Fourth channel:   -80dB

**AUDIO SPL (AT 30 cm WITH RATED AUDIO):**  
Weighted, 300-3000Hz  
90dB Nominal  
87dB Nominal (QXK models)



**NO.**

2 On page 2, **MODEL CONFIGURATION**, change the following as indicated:

<b>FACTORY I.D.</b>	<b>POWER LEVEL</b>	<b>FREQ.</b>	<b>SUBMERSIBLE</b>	<b>KEYPAD</b>	<b>DISPLAY</b>
H34QXN7139AN	1W-2W	448-470MHz	No	None	None
H44QXN7139AN	2W-5W	407-512MHz	No	None	None
H34YXN7139AN	1W-2W	448-470MHz	Yes	None	None
H44YXN7139AN	2W-5W	407-512MHz	Yes	None	None
H34QXJ7139AN	1W-2W	448-470MHz	No	3x1	LCD
H44QXJ7139AN	2W-5W	407-512MHz	No	3x1	LCD
H34QXK7139AN	1W-2W	448-470MHz	No	3x5	LCD
H44QXK7139AN	2W-5W	407-512MHz	No	3x5	LCD

**NO.**

3 On page 2, **SPECIALIZED TOOLS AND TEST EQUIPMENT**, change the following as indicated:

<b>SERVICE AIDS</b>			
<b><u>ITEM NO.</u></b>	<b><u>ACTION</u></b>	<b><u>PART NO.</u></b>	<b><u>DESCRIPTION</u></b>
RTL-4208A	added	-----	RF Coaxial Probe
5880348B33	added		SMA-BNC Adaptor (for Probe)
RTL-4225A	changed to	REN-4001A	Housing Eliminator

**NOTE:** If Housing Eliminator RTK-4225A is used, it will not be possible to key-load a SABER SECURENET radio through the cable.

<b><u>ITEM NO.</u></b>	<b><u>ACTION</u></b>	<b><u>PART NO.</u></b>	<b><u>DESCRIPTION</u></b>
RTL-4238A	added	-----	SABER RF Cable
TKN-8506A	changed to	-----	Keyload Cable (Hand-Held Keyloader to Radio)
0180358A60	added	-----	Keyload Cable (RTL-4200A to Radio)

<b>TEST EQUIPMENT</b>			
<b><u>ITEM NO.</u></b>	<b><u>ACTION</u></b>	<b><u>PART NO.</u></b>	<b><u>DESCRIPTION</u></b>
RTK-4237A	added	-----	Battery Tester

<b>FIELD PROGRAMMING EQUIPMENT</b>			
<b><u>ITEM NO.</u></b>	<b><u>ACTION</u></b>	<b><u>PART NO.</u></b>	<b><u>DESCRIPTION</u></b>
3080369B71	changed	-----	Computer Interface Cable (PC-AT)
3080369B72	added	-----	Computer Interface Cable (PC-XT)

**CURRENT DRAINS**

	<b>SABER I</b>	<b>SABER II AND III</b>
STANDBY	90	93
RECEIVE	220	223

4 On page 8, **SECURENET RADIO FUNCTIONAL TESTS, TRANSMITTER PERFORMANCE**, under **TEST/REFERENCE FREQUENCY - COMMENTS** change:

Frequency error =  $\leq 450\text{Hz}$  (VHF)  
 $\leq 750\text{Hz}$  (UHF)

5 On page 11, **ELECTRICAL PARTS LIST**, change the following:

<b>REF. SYM.</b>	<b>ACTION</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>
			<b>CAPACITOR, Fixed: <math>\mu\text{F} \pm 20\%</math>; 25V</b>
C10	changed to	2362998D51	0.15+10%;35V
C62	changed to	2362998B68	4.7;10V
C64, C65, C66	changed to	2160520C01	100pF $\pm 5\%$ ; 50V
C200, C217	changed to	2160520C01	100pF $\pm 5\%$ ; 50V
C223, C335	changed to	2160520C01	100pF $\pm 5\%$ ; 50V
C228, C230	changed to	2160520C01	100pF $\pm 5\%$ ; 50V
C231, C232	changed to	2160520C01	100pF $\pm 5\%$ ; 50V
C234, C239	changed to	2160520C01	100pF $\pm 5\%$ ; 50V
C500	deleted	2160520C01	100pF $\pm 5\%$ ;50V
			<b>FILTER:</b>
FL2	changed to	9105685Q05	Ceramic; 450kHz; 20kHz BW
FL3	changed to	9105685Q06	Ceramic; 450kHz; 15kHz BW
			<b>COILS, RF: unless stated</b>
L211,212	deleted	2405452C49	360nH $\pm 5\%$
			<b>SPEAKER:</b>
LS1	added	-----	28 $\Omega$ $\pm 10\%$ (part of Speaker/Microphone Flex Assembly)
			<b>MICROPHONE:</b>
MK1	added	-----	(part of Speaker/Microphone Flex Assembly)
			<b>PLUG:</b>
P5	changed to	REX-4166A	Contact Antenna
P6	changed to	3905445Q03	Contact, RF Wireform
			<b>RESISTOR, Fixed:</b>
R5	changed to	0660076E73	10k
R208	deleted	0660078G58	3.32k $\pm 1\%$
R209	changed to	0660076A49	1k
R216,217	changed to	0660076E73	10k
R219	changed to	0660079J33	20k
R222	changed to	0660076E73	10k
R225	changed to	0660076E73	10k
R406	changed to	0660076E73	10k
R411	changed to	0660079J33	20k
R412,413	changed to	0660079k02	100k $\pm 1\%$
R425	changed to	0660076E73	10k
R500	changed to	0660076E73	10k
R801	changed to	-----	200k (part of PTT/Controls Flex, RPX4700A or RPX4701A)
R802	changed to	-----	68k (part of PTT/Controls Flex,
R804	changed to	-----	33k (part of PTT/Controls Flex, RPX4700A or RPX4701A)
R805	changed to	-----	1k (part of PTT/Controls Flex, RPX4700A or RPX4701A)
			<b>CIRCUIT MODULE:</b>
U2	changed to	NLE9431A	Filter/Amplifier/Mixer (403-433)
	or	NLE9432A	Filter/Amplifier/Mixer (440-470)
	or	NLE9433A	Filter/Amplifier/Mixer (460-490)
	or	NLE9434A	Filter/Amplifier/Mixer (482-512)

5 On page 11, **ELECTRICAL PARTS LIST**, Cont'd.

<u>REF. SYM.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
U202	changed to	NLE9471A	5W-Power Amplifier (403-433)
	or	NLE9472A	5W-Power Amplifier (440-470)
	or	NLE9473A	5W-Power Amplifier (460-490)
	or	NLE9474A	5W-Power Amplifier (482-512)
	or	NLE9483A	2W-Power Amplifier (440-470)
	or	NLE9741A	2W-Power Amplifier (403-433)
U203	added	NFE6061A	Filter/Detector/Switch (403-470)
	or	NFE6062A	Filter/Detector/Switch (460-512)
U300	changed to	NLE9461A	Synthesizer (403-433)
	or	NLE9462A	Synthesizer (440-470)
	or	NLE9463A	Synthesizer (460-490)
	or	NLE9464A	Synthesizer (482-512)
JU101, JU102	added	not used	<b>JUMPER</b>
VR802, VR813	deleted	4880140L11	<b>DIODE:</b> Zener, 7.5V; SOT

For radios with the H852 option: these units can only be addressed with field programmer software release R04.00.00 or later. Do not attempt to reprogram radios with this option with any previous release of field programmer software. The hardware modifications are listed below for option H852:

<u>REF. SYM.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
U400	changed to	0105954S78	<b>CIRCUIT MODULE:</b> Microphone, MC68HC11
U700	changed to	0105954S90	Signal Filter, CMOS

6 On page 12, **SABER I, II, and III, EXPLODED VIEW PARTS LISTS**, change:

<u>ITEM NO.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
—	added	7505316J04	PAD, Microphone
33	changed desc	NTN4538A	BATTERY, FM/Submersible, 900mAh
	or	NTN4596A	BATTERY, FM/Submersible. 1500mAh
46	changed to	1405807U01	BOOT, Microphone
50	changed to	4205872S01	RETAINER, Speaker

For radios with the H852 option: these units can only be addressed with field programmer software release R 04.00.00 or later. Do not attempt to reprogram radios with this option with any previous release of field programmer software. The hardware modifications are listed below for option H852:

<u>ITEM NO.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
25	changed to	NLE9980A	ASSEMBLY, UHF Main PCB
43	changed to	NHN6410A	ASSEMBLY, Housing, SABER I (includes items 34-42)
	or	NHN6440A	ASSEMBLY, Housing, SABER II (includes items 34-42)
	or	NHN6412A	ASSEMBLY, Housing, SABER III (includes items 34-42)

**7 On page 12, SABER II and III, EXPLODED VIEW PARTS LISTS,**

<u>ITEM NO.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
---	added	7505316J03	PAD, Speaker Bracket
---	added	7505934Q02	PAD, DVP
50	changed to	8405937R01	FLEX CIRCUIT, LCD Interconnect
	added	1405888Q02	INSULATOR, Front Shield

For radios with Factory ID numbers ending with a 'CN' suffix, for example H33SAN7139CN, the following changes apply:

<u>ITEM NO.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
49	changed to	840999A65	ASSEMBLY, 8k Display PCB, SABER II (includes item 48)
	or	8460999A67	ASSEMBLY, 2k Display PCB, SABER II (includes item 48)

**8 SABER 2K AND SABER III DISPLAY ELECTRICAL PARTS LIST**

For radios with Factory ID numbers ending with a 'CN' suffix, for example H33SAN7139CN, the following changes apply:

<u>REF NO.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
R507	changed to	0660076E73	10k
U502	changed to	0105954P48	Microcomputer, HCMOS

**9 Exploded View Parts List- For SABER I,II, AND III UHF**

<u>ITEM NO.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
11	changed to	3205082E80	GASKET, O-Ring (part of item 13)

**10 On page 12, EXPLODED VIEW DIAGRAMS AND PARTS LISTS  
FOR SABER II AND III ONLY UHF**

<u>ITEM NO.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
50	changed to	8405712U01	FLEX CIRCUIT, LCD Interconnect

### CLEANING

- Clean all external radio surfaces with a 0.5% solution of a mild dishwashing detergent in water (one teaspoon of detergent per gallon of water).
- Stronger cleaning agents may only be used to remove soldering flux from circuit boards after making repairs.

### CAUTION

*Never allow any alcohol- or solvent-based product to contact any plastic or rubber radio part.*

- Clean internal surfaces with water-activated optical wipes.

### RELATED PUBLICATIONS AVAILABLE SEPARATELY

SABER I SECURENET OPERATING INSTRUCTIONS.....	68P81045C60
SABER II SECURENET OPERATING INSTRUCTIONS.....	68P81045C65
SABER III SECURENET OPERATING INSTRUCTIONS.....	68P81048C40
SECURENET SERVICE MANUAL (VHF) .....	68P81045C70
SECURENET THEORY/ MAINTENANCE MANUAL.....	68P81045C85
FIELD PROGRAMMER USER'S GUIDE.....	68P81044C65

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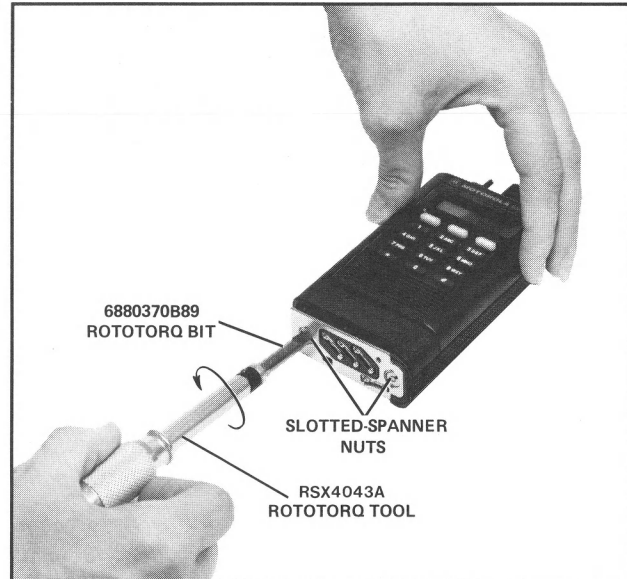
# DISASSEMBLY/REASSEMBLY PROCEDURES

## 1. DISASSEMBLY

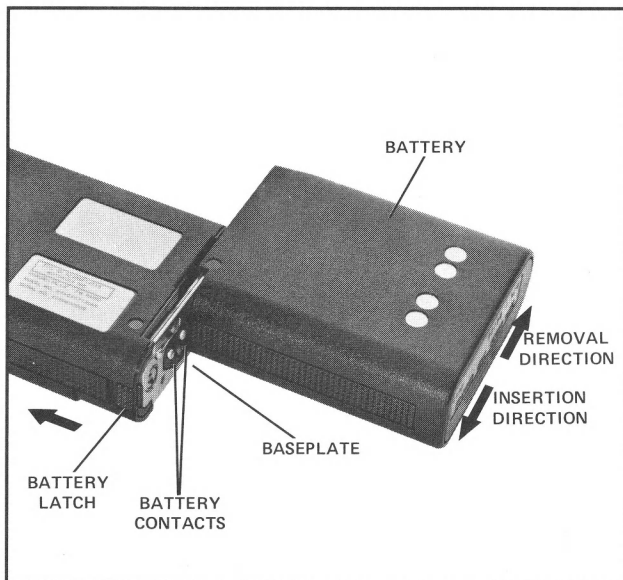
- a. **Turn off the radio** by rotating the on/off/volume control knob fully counterclockwise until you hear a click. Remove the universal connector cover or any accessory connected to the radio before beginning disassembly.



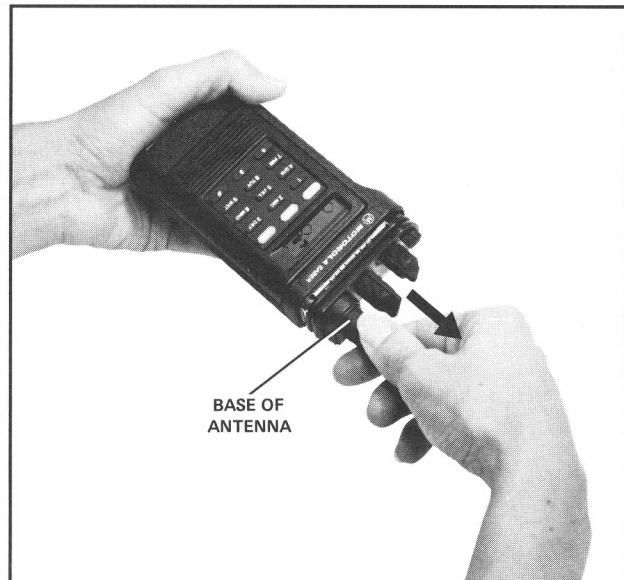
- c. **Loosen the two slotted-spanner nuts** on the bottom of the radio using Rotatorq tool bit No. 6680370B89. When loosened, the slotted-spanner nuts are captive and will spin freely without separating from the baseplate.



- b. **Remove the battery** from the baseplate on the bottom of the radio housing by pushing the spring-loaded battery latch toward the top of the radio, and sliding the battery away from the latch until it clears the baseplate.



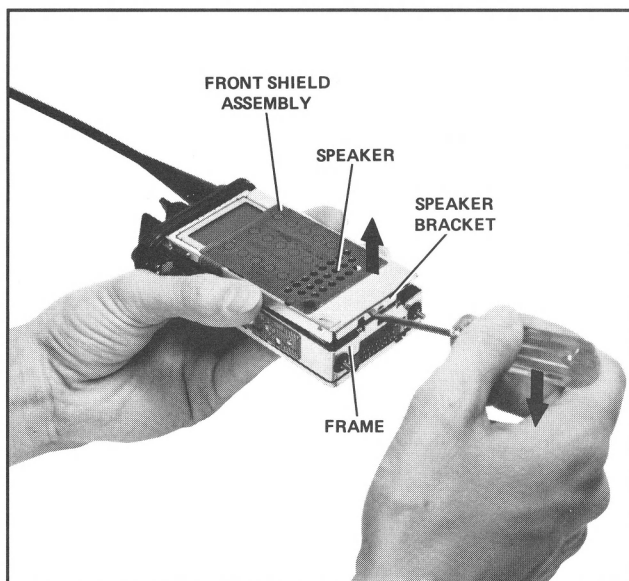
- d. **Remove the frame assembly** from the radio housing by grasping the antenna at its base and pulling it gently upward. *Do not depress the PTT switch during removal and do not push on the slotted-spanner nuts to lift the frame assembly.*



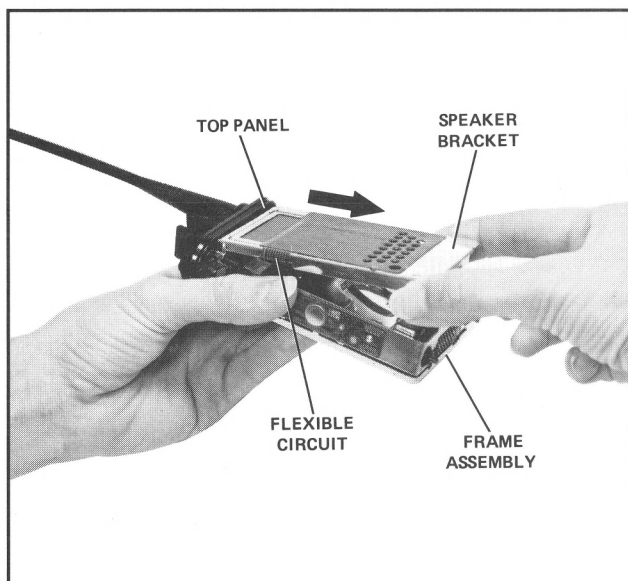
### CAUTION

Ensure that all static electricity safeguards are in place.

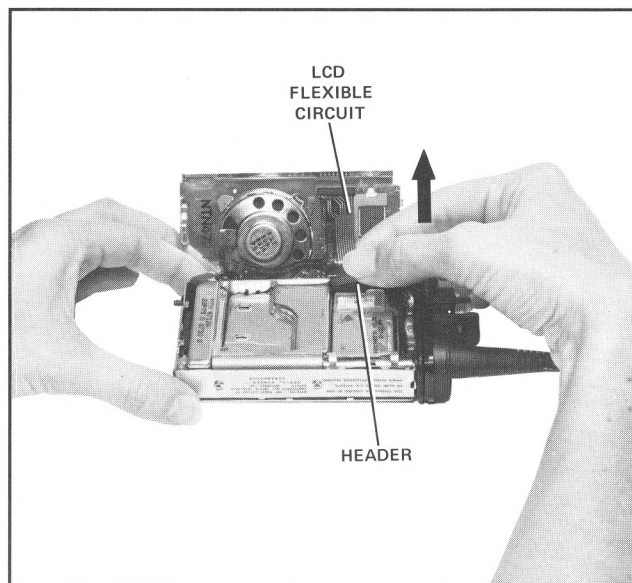
- e. With the speaker facing upward, **remove the speaker bracket assembly** by inserting a thin screwdriver blade between the frame and the bottom of the speaker bracket, and prying gently upward on the speaker bracket until it is disengaged from the frame.



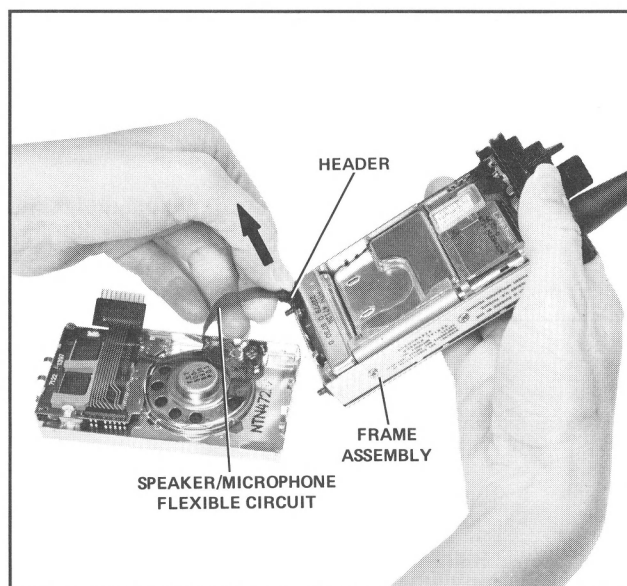
- f. **Lift the speaker bracket assembly** away from the bottom of the frame assembly, then pull it out from under the plastic top panel. Be careful not to pull against the flexible circuits connecting the speaker bracket to the frame assembly.



- g. *ON SABER II AND SABER III RADIOS ONLY:* **Disconnect the LCD interconnect flexible circuit** from the frame assembly by pulling the header straight out and away from the main printed circuit board.



- h. **Disconnect the speaker/microphone flexible circuit** from the frame assembly by pulling the connector straight out and away from the main printed circuit board.



### CAUTION

Refer to "SERVICING MAJOR SUBASSEMBLIES" (Section 2) and the appropriate exploded view diagrams at the back of this manual before attempting further disassembly or repair.

## 2. SERVICING MAJOR SUBASSEMBLIES

### a. Baseplate

- All repairs to the baseplate assembly can, and should, be made with the radio chassis inside the radio.
- After the slotted-spanner nuts are loosened, the baseplate is held in place by the power contact screws.
- The retainers holding the slotted-spanner nuts in place are not reusable. Replacement of the retainers requires special insertion procedures; refer to the instruction sheet provided with the slotted-spanner nut kit.
- The "o-ring" portions of the elastomer seal must be fully seated on the threaded bushings before the baseplate is reassembled (the bushings are part of the housing assembly).

### b. Housing Assembly

- The housing assembly includes many parts that are not replaceable or repairable.
- The insulator on the universal connector can, and should, be replaced if the old insulator has been torn. When replacing the insulator take care to keep it out of the main seal o-ring's seating area.
- The PTT lever can be replaced by prying out the old part with a soft plastic tool. The plastic housing around the lever may be damaged if a harder tool is used.

### c. Control Top Panel

- The control top panel is fastened to the frame by the on/off/volume and frequency switches, and two self-tapping screws; it should be removed from the frame only if absolutely necessary. If repair is required, always start the screws into the control top panel by hand before tightening them with a torque wrench; this will help avoid cross-threading and stripping of the plastic panel.
- The on/off/volume and frequency knobs are 2-part kits; each kit consists of a knob and an insert. Once an insert is removed, it cannot be used again; therefore, remove an insert only if the on/off/volume control or frequency switch must be replaced, or if the control top must be removed from the frame.

- The number of frequency switch positions can be changed by removing the frequency knob and insert, and aligning the top tab on the detent washer with the number on the escutcheon that is equal to the desired number of frequency positions minus three. For example, a 12-position frequency switch would have the top tab aligned with the "9" on the escutcheon. A new frequency knob and insert must be used each time this change is made.

#### NOTE

There are different detent washers for even or odd numbers of switch positions; see the appropriate exploded view parts list.

### d. LCD/Speaker Bracket Assembly

- The LCD assembly can be replaced on SABER II and III radio PC board assemblies, but the instructions on the replacement kit's instruction sheet must be strictly followed.
- The microphone boot must be properly oriented and seated in the speaker bracket **before** the microphone is pressed into place.

### e. Backshield Assembly

- Before removing the backshield, ensure that all static electricity safeguards are in place.
- For best results, loosen/tighten all four screws lightly before loosening/tightening any single screw completely.
- The backshield screws are held captive in the shield after being loosened.

### f. Circuit Boards and Modules

- All modules plug into sockets on the main circuit board.
- Some modules are fastened to the main board and frame with screws; remove these screws before attempting to unplug a module. **Never** substitute any screw.
- Several of the modules are designed to be removed with a standard DIP extractor tool (OK-1 or equivalent). Always use the extractor tool when removing these modules to avoid damaging their leads.

- Some modules have guide pins to assist in insertion or removal. Pressure may be applied to these guide pins to aid removal of a module if, and only if, it is distributed evenly over all guide pins on the module. *Applying all the force to a single guide pin will cause severe damage to the module.*
- The U900 module is not serviceable.
- Before reinserting any module, always check its leads for damage. Gently straighten any leads that may be bent; replace any modules with severely damaged leads.
- Before reinserting reference oscillator module U301 into the main circuit board, be certain that its squared (pin 1) corner is correctly oriented per the main circuit board component layout diagram.
- When electrically testing and/or probing the main circuit board with the back shield removed, always use the three finger screws on the SABER housing eliminator service aid to provide grounding to VCO synthesizer module U300 (two places), and the rf ground clip (one place).
- When removing the main circuit board from the frame assembly, do the following:
  1. Remove the back shield assembly.
  2. Unplug the PTT/controls flexible circuit.
  3. Remove power amplifier module U202.
  4. Remove the two main compression connector screws.
  5. Lift the board at the bottom and pull out from under the control top panel.
- The rf and ground contacts at the top of the main circuit board are exposed when the board is removed from the frame. Special care must be taken to avoid accidental damage to these contacts.

#### g. Frame Assembly

- The tapped tabs on the frame can be stripped if excessive screw tightening torques are used (see Torque Specifications table). The frame is not repairable.
- If you must lift or remove the PTT/controls flex circuit for any reason, do not readhere it to the frame; the flex must be replaced.

#### h. Dual-Function Switch (S801) and Actuator Assembly

- Before removing the switch, remove the knob by gently separating the two arms of the switch bracket (located between the switch and the main O-ring seal) and pulling upward on the knob.
- Before reinserting the knob, ensure that the slot in the switch is properly aligned with the blade on the knob's shaft.
- When the knob is properly inserted, the arms of the switch bracket will snap into position (approximately 0.2 inches apart), the knob will not be loose in the switch bracket, and the bracket will hold the switch firmly against the inside of the top control panel. If this is not the case, replace the switch bracket.

### 3. REASSEMBLY

Reassemble the radio in the reverse order of disassembly, referring to "SERVICING MAJOR SUB-ASSEMBLIES" (Section 2) and making certain:

- that the speaker/microphone connector (and the LCD interconnect header on SABER II and III radios) is correctly aligned so that no twisting or pinching of the flexible circuit occurs when the speaker bracket is reattached to the frame assembly.
- that the two extended tabs at the top of the speaker bracket are properly inserted into the slots between the frame and the control top panel.
- to tighten all hardware loosened or removed during disassembly per the torque specifications listed in the Torque Specifications table. Use recommended torque driver (Motorola RSX4043A Rotatorq Tool or equivalent).
- that there is no foreign material on the main O-ring or stud seals.

#### CAUTION

Inspect the frame stud seals and the top panel O-ring and replace if any damage exists.

- to properly orient the completed frame assembly before inserting it into the radio housing.
- *that the PTT switch and monitor button are not depressed while the frame is being inserted into the housing.*

## TORQUE SPECIFICATIONS

APPLICATION	TORQUE (IN. LBS.)	TORQUE (N·m)	TORQUE BIT NO.
Antenna Bushing Spanner Nut	20	2.27	6680370B90
Back Shield to Frame Screws	2.5	0.28	6680321B79
Bottom Connector to Frame Screws	2.5	0.28	6680321B79
Frequency Switch Spanner Nut	8	0.91	6680370B88
All Module Screws	2.5	0.28	6680321B79
Power Contact Screws	2.5	0.28	6680321B79
Slotted-Spanner Nut (Baseplate)	4	0.45	6680370B89
Top Panel to Frame Screws	2	0.23	6680321B79
Volume Pot Spanner Nut	8	0.91	6680370B88

## SECURENET RADIO FUNCTIONAL TESTS (@ 7.5Vdc)

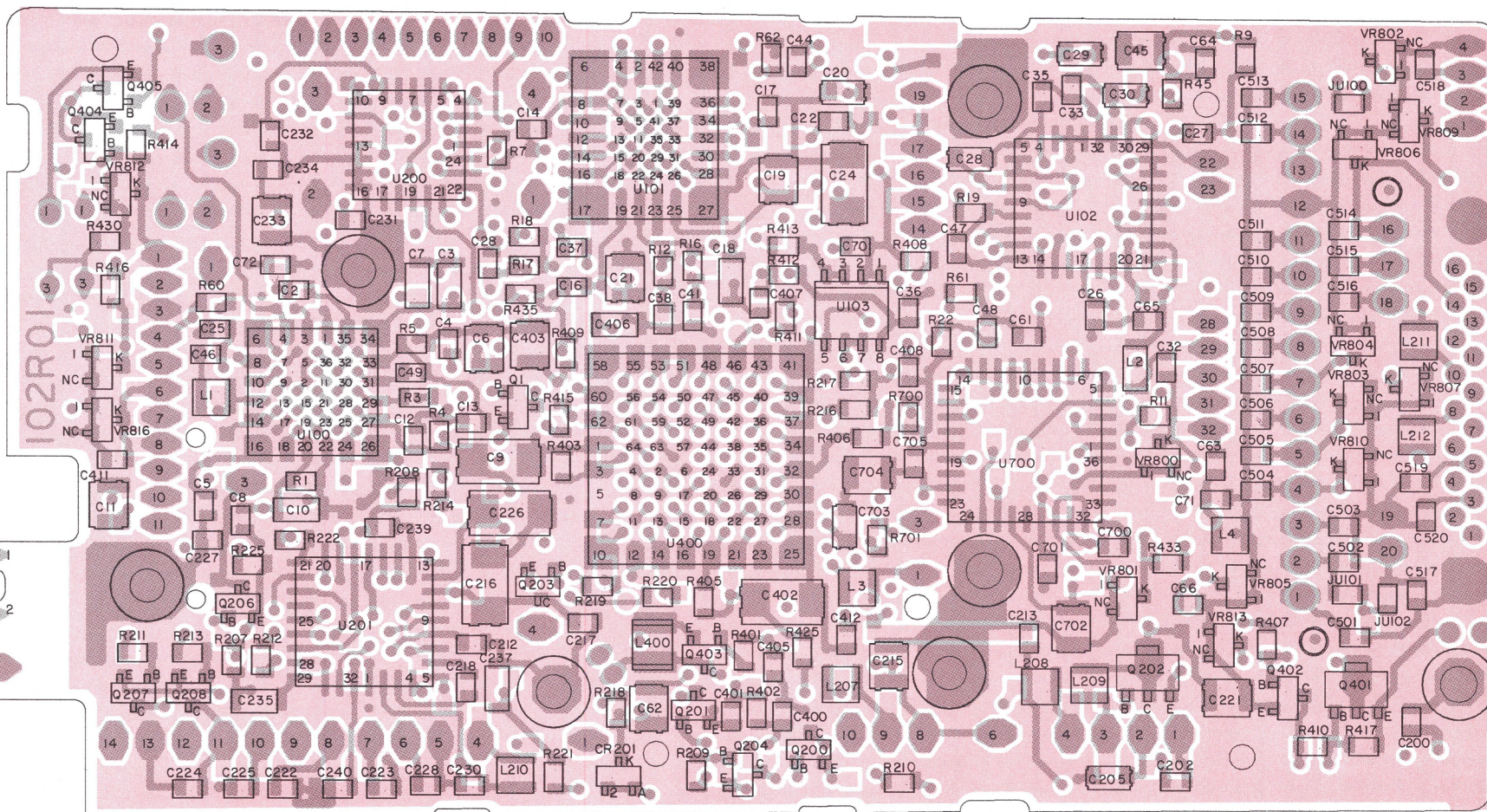
TRANSMITTER PERFORMANCE				
TEST	SERVICE MONITOR	RADIO	TEST BOX	COMMENTS
<b>REFERENCE FREQUENCY</b>	Set to <b>POWER MONITOR, FREQ. ERROR</b> ; frequency to radio transmit frequency; input to <b>RF IN/OUT</b> .	Set to channel corresponding to frequency of test.	PTT Continuous (during performance check).	Frequency error = ≤200 Hz (vhf) ≤450 Hz (uhf)
<b>RF POWER OUT</b>	Same as above, except set monitor to measure <b>POWER</b> .	Set to channel corresponding to frequency and power level under test.	PTT Continuous (during performance check).	RF power output ≥ published specs for channel under test.*
<b>VOICE MODULATION</b>	Same as above, except set monitor to measure <b>DEVIATION</b> .	Set to channel corresponding to frequency and power level under test.	Input a 1kHz tone @ ≈50 mVrms to radio's microphone (through test box). PTT continuous (during performance check).	Listen for 1kHz tone from monitor. Deviation should be ≥4.0kHz and ≤5.0kHz.
<b>CODED VOICE MODULATION</b>	Load monitor with same key used in radio. Select proper algorithm and <b>DEVIATION</b> test with <b>SECURE COM TEST MENU</b> on screen.	Set to channel corresponding to freq. and power level under test. With key loaded, set radio to coded mode.	Same as above.	Listen for decoded 1kHz tone from monitor. Deviation should be ≥3.5kHz and ≤4.5kHz.
RECEIVER PERFORMANCE				
<b>RATED AUDIO</b>	Set to <b>GENERATOR</b> ; frequency to radio receive frequency; 1 mV rf output; 1kHz modulation; 3kHz deviation.	Set to open squelch.	Speaker selector on position "A"; switch to load.	Verify that audio is present; adjust radio volume control to read 3.7 to 3.9 Vac on DVM.
<b>12dB SINAD</b>	Same as above, except set monitor to measure <b>SINAD</b> .	Set to open squelch.	Set to speaker load.	Reduce rf level to achieve 12dB SINAD; rf level ≤ published specs.
<b>RECEIVE CODED VOICE</b>	Load monitor with same key used in radio; make sure 1kHz level and all other modulation are turned off when switching to <b>GENERATE</b> . Select <b>TEST</b> under <b>SECURE COM MENU</b> .	Set to channel corresponding to freq. and power level under test. Make sure key is loaded into radio.	Speaker selector on position "A."	Increase 1kHz level on monitor and listen for 1kHz tone from test box.

### NOTES:

Tests should be performed with Test Box RTX-4005B, and associated Test Cable RTK-4203A.

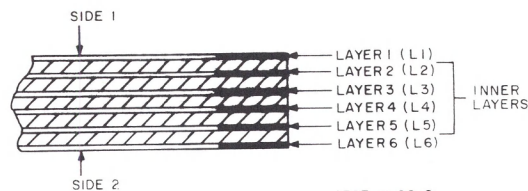
\*RF power levels can be different for each individual channel; refer to Radio Information Sheet.

SIDE 1 VIEWED FROM SIDE 1



L1-CEPF-17668-0  
L6-CEPF-17669-0  
OLI-CEPF-17670-0

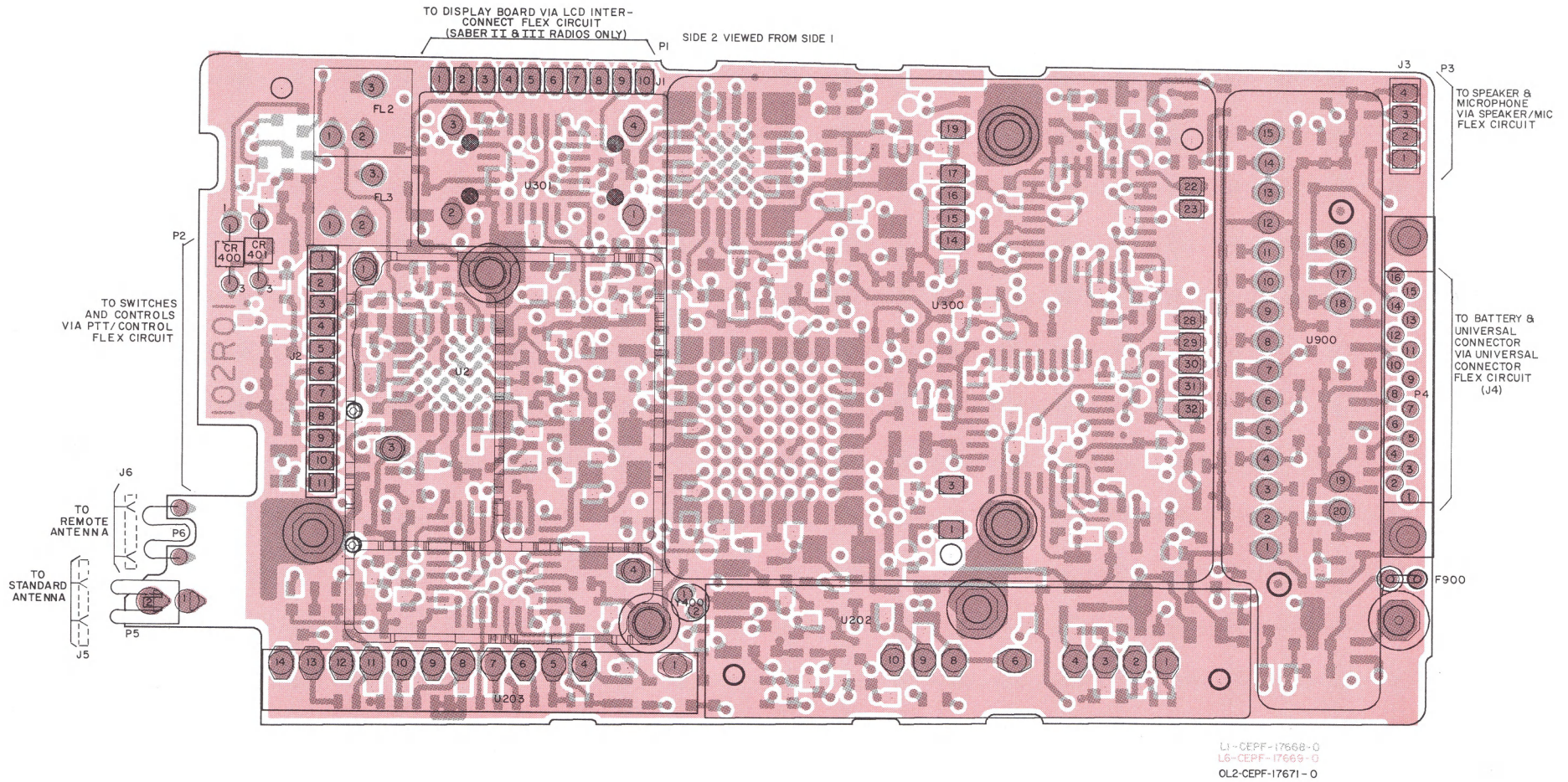
6-LAYER CIRCUIT BOARD COPPER DETAIL VIEWING  
COPPER STEPS AT EDGE OF BOARD IN PROPER  
LAYER SEQUENCE.



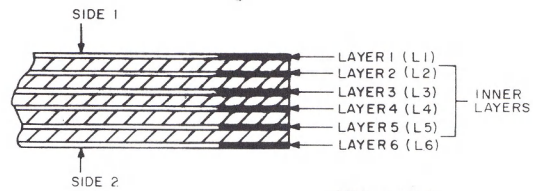
AEPF-18100-0

MAIN CIRCUIT BOARD  
COMPONENT LAYOUT DIAGRAM  
SIDE 1 VIEWED FROM SIDE 1

# MAIN CIRCUIT BOARD COMPONENT LAYOUT DIAGRAM SIDE 2 VIEWED FROM SIDE 1



6-LAYER CIRCUIT BOARD COPPER DETAIL VIEWING  
COPPER STEPS AT EDGE OF BOARD IN PROPER  
LAYER SEQUENCE.



AEPF-18100-0

# SABER UHF SECURENET

## Electrical Parts List

TPLF-3496-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C1	2160521A15	1500pF±5%
C2	2160521H41	22.80-20%
C3	2160521G37	0.1+80-20%
C4	2160521A11	680pF
C5	2362998B68	4.7, 10V
C6	2160521H41	22.80-20%
C7	2160521G37	0.1+80-20%
C8	2362998B73	10, 16V
C9	2160521H39	15, +80%-20%
C10	2362998B64	2.2, 20V
C11	2160521A11	680pF ±5%
C12	2160521E25	.01
C13	2160521G37	0.1+80-20%
C14	2160521G37	Not Used
C15	2160520B17	47pF±5%
C16	2160521G37	0.1+80-20%
C17	2160521H41	22.80-20%
C18	2362998B16	3.3±10%; 16V
C19	2362998B68	1, 16V
C20	2362998B68	4.7, 10V
C21	2160521G37	0.1+80-20%
C22	2160521A19	3300pF±5%
C23	2362998B69	4.7, 20V
C24	2160521A21	Not Used
C25	2160521A32	4700pF±5%
C26	2160521A32	.039±5%
C27	2362998B59	1, 16V
C28	2160521G37	Not Used
C29	2160521A32	.039±5%
C30	2160521H43	33-80-20%
C31	2160521H43	Not Used
C32	2160521H43	Not Used
C33	2160521H43	Not Used
C34	2160521H43	Not Used
C35	2160521H43	Not Used
C36,37	2160521G37	0.1+80-20%
C38	2160520C01	100pF±5%
C39,40	2160520C01	Not Used
C41	2160520C01	100pF±5%; 50V
C42,43	2160521G37	Not Used
C44	2362998B16	0.1+80-20%
C45	2362998B16	3.3±10%; 16V
C46	2160520C01	100pF±5%; 50V
C47	2160521E25	.01
C48	2160521A29	.022±5%
C49	2160521A29	Not Used
C50	2160521A29	Not Used
C51	2362998D27	.022±5%
C52	2160521G37	4.7±20%; 4V
C53	2160520G01	0.1+80-20%
C54	2160520G01	100pF±5%; NPO
C55	2160521E28	.018
C56	2160520B24	91pF±25%; NPO

C200	2160520G01	100pF±5%
C201	2160521E28	Not Used
C202	2160521E28	.018
C203,204	2362998B05	Not Used
C205	2362998B05	4.7±10%
C206	2160521E28	Not Used
C207	2160521E28	.018
C208	2362998B16	10, 16V
C209	2160520G01	100pF±5%
C210	2160521G37	Not Used
C211	2160521G37	4.7, 10V
C212	2362998B68	3300pF±5%
C213	2160520G01	100pF±5%
C214	2160521A19	3300pF±5%
C215	2160520G01	100pF±5%
C216	2160521A19	3300pF±5%
C217	2160520G01	100pF±5%
C218	2160521G37	Not Used
C219	2160520G01	100pF±5%
C220	2160521A19	3300pF±5%
C221	2160520G01	100pF±5%
C222	2160521A19	3300pF±5%
C223	2160520G01	100pF±5%
C224	2160521A19	3300pF±5%
C225	2160520G01	100pF±5%
C226	2160521A19	3300pF±5%
C227	2160521E28	.018
C228	2160520G01	100pF±5%
C229	2160520G01	Not Used
C230	2160520G01	100pF±5%
C231	2362998B16	3.3±10%; 16V
C232	2160520G01	100pF±5%
C233	2160521H41	22+80-20%
C234	2160521H41	Not Used
C235	2160521H41	Not Used
C236	2160521H41	Not Used
C237	2160521H41	Not Used
C238	2160521H41	Not Used
C239	2160520G01	100pF±5%
C240	2160520B10	24pF±5%; 50V; NPO
C241	2160520B10	24pF±5%; 50V; NPO
C242	2160520B10	24pF±5%; 50V; NPO
C243	2160520B10	24pF±5%; 50V; NPO
C244	2160520B10	24pF±5%; 50V; NPO
C245	2160520B10	24pF±5%; 50V; NPO
C246	2160520B10	24pF±5%; 50V; NPO
C247	2160520B10	24pF±5%; 50V; NPO
C248	2160520B10	24pF±5%; 50V; NPO
C249	2160520B10	24pF±5%; 50V; NPO
C250	2160520B10	24pF±5%; 50V; NPO
C251	2160520B10	24pF±5%; 50V; NPO
C252	2160520B10	24pF±5%; 50V; NPO
C253	2160520B10	24pF±5%; 50V; NPO
C254	2160520B10	24pF±5%; 50V; NPO
C255	2160520B10	24pF±5%; 50V; NPO
C256	2160520B10	24pF±5%; 50V; NPO
C257	2160520B10	24pF±5%; 50V; NPO
C258	2160520B10	24pF±5%; 50V; NPO
C259	2160520B10	24pF±5%; 50V; NPO
C260	2160520B10	24pF±5%; 50V; NPO
C261	2160520B10	24pF±5%; 50V; NPO
C262	2160520B10	24pF±5%; 50V; NPO
C263	2160520B10	24pF±5%; 50V; NPO
C264	2160520B10	24pF±5%; 50V; NPO
C265	2160520B10	24pF±5%; 50V; NPO
C266	2160520B10	24pF±5%; 50V; NPO
C267	2160520B10	24pF±5%; 50V; NPO
C268	2160520B10	24pF±5%; 50V; NPO
C269	2160520B10	24pF±5%; 50V; NPO
C270	2160520B10	24pF±5%; 50V; NPO
C271	2160520B10	24pF±5%; 50V; NPO
C272	2160520B10	24pF±5%; 50V; NPO
C273	2160520B10	24pF±5%; 50V; NPO
C274	2160520B10	24pF±5%; 50V; NPO
C275	2160520B10	24pF±5%; 50V; NPO

FL3	9105685Q12	Ceramic; 450kHz; 15kHz BW
J1	0905287C05	JACK: Socket, Printed Circuit (LCD Interconnect)(10 req'd)
J2	0905287C05	Socket, Printed Circuit (PTT Controls Flex)(11 req'd)
J3	0905287C05	Socket, Printed Circuit (Speaker/Mic Connector)(4 req'd)
L1	2405452C64	COIL, RF: unless stated
L2	2405452A05	1500Hz±5%
L3	2405452C49	Choke; 4.7uH
L4	2405452C09	360nH±5%
L200	2405452C49	Not Used
L207	2405452C49	360nH±5%
L400	2405452A40	33uH
P1	2805520Q01	PLUG: Not Used
P4	2805520Q01	Not Used
P5	3905446Q03	Connector
P6	3905446Q03	Contact, Antenna
P7	3905446Q03	Contact, RF Wireform
Q1	4805128M16	TRANSISTOR: See Note 1
Q2	4805128M44	PNP; SOT-23
Q200,201	4805128M44	Not Used
Q202	4805128M27	PNP; SOT-89
Q203	4805128M16	PNP; SOT-23
Q204	4805128M16	PNP; SOT-23
Q205	4805128M16	PNP; SOT-23
Q206	4805128M16	PNP; SOT-23
Q207,208	4805128M29	PNP; SOT-23
Q400	4805128M29	Not Used
Q403	4805128M03	NPN; SOT-23
Q404	4805128M44	NPN; SOT-23
Q405	4805128M44	NPN; SOT-23
R1	0660079V23	RESISTOR, Fixed: ±5%; 1/8W
R2	0660079V23	Not Used
R3	0660079V23	Not Used
R4	0660079V23	Not Used
R5	0660079V23	Not Used
R6	0660079V23	Not Used
R7	0660079V23	Not Used
R8	0660079V23	Not Used
R9	0660079V23	Not Used
R10	0660079V23	Not Used
R11	0660079V23	Not Used
R12	0660079V23	Not Used
R13	0660079V23	Not Used
R14	0660079V23	Not Used
R15	0660079V23	Not Used
R16	0660079V23	Not Used
R17	0660079V23	Not Used
R18	0660079V23	Not Used

R19	0660079V23	Not Used
R20	0660079V23	Not Used
R21	0660079V23	Not Used
R22	0660079V23	Not Used
R23	0660079V23	Not Used
R24	0660079V23	Not Used
R25	0660079V23	Not Used
R26	0660079V23	Not Used
R27	0660079V23	Not Used
R28	0660079V23	Not Used
R29	0660079V23	Not Used
R30	0660079V23	Not Used
R31	0660079V23	Not Used
R32	0660079V23	Not Used
R33	0660079V23	Not Used
R34	0660079V23	Not Used
R35	0660079V23	Not Used
R36	0660079V23	Not Used
R37	0660079V23	Not Used
R38	0660079V23	Not Used
R39	0660079V23	Not Used
R40	0660079V23	Not Used
R41	0660079V23	Not Used
R42	0660079V23	Not Used
R43	0660079V23	Not Used
R44	0660079V23	Not Used
R45	0660079V23	Not Used
R46	0660079V23	Not Used
R47	0660079V23	Not Used
R48	0660079V23	Not Used
R49	0660079V23	Not Used
R50	0660079V23	Not Used
R51	0660079V23	Not Used
R52	0660079V23	Not Used
R53	0660079V23	Not Used
R54	0660079V23	Not Used
R55	0660079V23	Not Used

S800	RPX4690A	SWITCH: Kit, On/Off/Volume (includes R800)
S801/S804	4005221R01	Dual-Function, Clear/Code (S804)(Standard) and Emergency (S801)(Optional)
S802	RPX4694A	Not Used
S803	RPX4694A	Kit, Contact Snapdome, PTT
S805	RPX4694A	Kit, Contact Snapdome, Monitor
S806	RPX4694A	Not Used
S823	RPX4694A	Kit, Frequency
U1	NLE9431A	CIRCUIT MODULE: See Note 1
U2	NLE9432A	Not Used
U3	NLE9433A	Filter/Amp/Mixer (403-432 MHz)
U4	NLE9434A	Filter/Amp/Mixer (440-470 MHz)
U5	NLE9435A	Filter/Amp/Mixer (470-500 MHz)
U6	NLE9436A	Filter/Amp/Mixer (490-512 MHz)
U7	NLE9437A	IC, I-F
U8	NLE9438A	IC, Audio Filter, CMOS
U9	NLE9439A	IC, Audio, Bipolar
U10	NLE9440A	IC, Regulator
U11	NLE9441A	IC, Digital/Analog Converter, CMOS
U12	NLE9442A	Transmit Automatic Level Control
U13	NLE9443A	SW-Power Amplifier (403-432 MHz)
U14	NLE9444A	SW-Power Amplifier (440-470 MHz)
U15	NLE9445A	SW-Power Amplifier (470-500 MHz)
U16	NLE9446A	SW-Power Amplifier (490-512 MHz)
U17	NLE9447A	2W-Power Amplifier (440-470 MHz)
U18	NLE9448A	Synthesizer (403-432 MHz)
U19	NLE9449A	Synthesizer (440-470 MHz)
U20	NLE9450A	Synthesizer (470-500 MHz)
U21	NLE9451A	Synthesizer (490-512 MHz)
U22	NLE9452A	Oscillator, Reference; 16.8MHz
U23	NLE9453A	Microcomputer, MC68HC11; Binary
U24	NLE9454A	Signal Filter, Phase 1, CMOS
U25	NLE9455A	SECURENET Bypass Module
U26	NLE9456A	Optional Encryption Module
VR800	4805129M35	DIODE: See Note 1
VR801	4805129M49	Zener, 5.6V
VR802	4805129M49	Zener, 16V
VR803	4805129M35	Zener, 7.5V
VR804	4805129M35	Zener, 5.6V
VR805	4805129M35	Zener, 5.6V
VR806	4805129M35	Zener, 5.6V
VR807	4805129M35	Zener, 5.6V
VR808	4805129M35	Zener, 5.6V
VR809	4805129M35	Zener, 5.6V
VR810	4805129M35	Zener, 5.6V
VR811	4805129M35	Zener, 5.6V
VR812	4805129M35	Zener, 5.6V
VR813	4805129M35	Zener, 5.6V
VR814	4805129M35	Zener, 5.6V
VR815	4805129M35	Zener, 5.6V

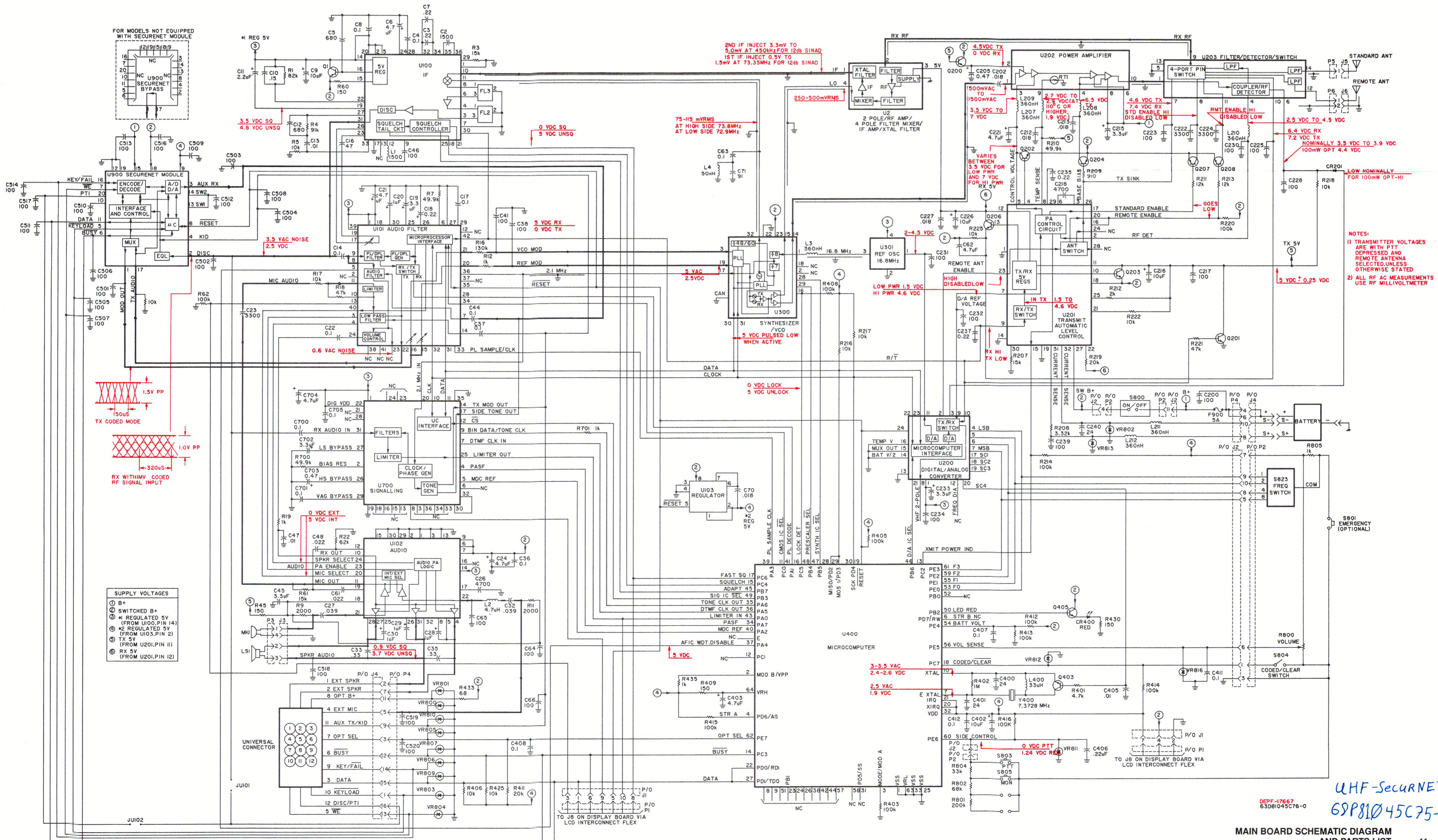
Y400	4805664G32	CRYSTAL: 7.3728MHz
NONREFERENCED ITEMS		
0905287C05	SOCKET, Printed Circuit	(for all modules)(7 req'd)
1405881R01	BOOT, Crystal (For Y400)	
7505934Q01	PAD, Oscillator (For U301)	

NOTE:  
1. For optimum performance, order replacement diodes, transistors, and circuit modules by Motorola part number only.

## SCHEMATIC AND CIRCUIT BOARD NOTES

1. Unless otherwise stated, resistances are in ohms (k = 1000), capacitances less than 1 are in microfarads, and capacitances 1 or greater are in picofarads.

TEPF-17445-O



SABER I SECURENET UHF  
Exploded View Parts List

TPLF-3497-O

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	RPX4720A	ASSEMBLY, Frame Stud (includes item 5)
2	RPX4689A	KIT, Frequency Switch (S823) (includes item 4)
3	RPX4690A	KIT, On/Off Switch (S800)/Volume Control (R800) (includes item 4)
4	3205082E62	GASKET, O-Ring (2 req'd) (part of items 2 and 3)
5	3205422Q01	SEAL, Stud (2 req'd) (part of item 1)
6	6105436Q01	LIGHTPIPE, LED
7	3205082E59	GASKET, O-Ring
8	0305714J09	SCREW, Module, Ph Pan Hd; 2-56x3/8" (7 req'd)
9	0305381L02	SCREW, Top Panel; 2-32 (2 req'd)
10	RPX4693A	KIT, Antenna Bushing (includes item 12)
11	3205082E71	GASKET, O-Ring (part of item 13)
12	3205082E58	GASKET, O-Ring (part of item 10)
13	RPX4692A	KIT, Control Top Panel (includes item 11)
14	0400139731	LOCKWASHER, Internal Tooth
15	0205591R01	NUT, Antenna Bushing
16	0405781Q01	WASHER, Detent (even number of switch positions)
or	0405781Q03	WASHER, Detent (odd number of switch positions)
17	NAE6431A	ANTENNA, UHF Helical (403 - 433 MHz)
or	NAE6432A	ANTENNA, UHF Helical (438 - 470 MHz)
or	NAE6434A	ANTENNA, UHF Helical (470 - 512 MHz)
or	NAE6440A	ANTENNA, UHF Whip (403 - 512 MHz)
18	RPX4699A	KIT, Frequency Knob
19	RPX4698A	KIT, On/Off/Volume Knob
20	1305622Q09	ESCUTCHEON, SECURENET, No Knob
or	1305622Q07	ESCUTCHEON, SECURENET, Push-Only
or	1305622Q03	ESCUTCHEON, SECURENET, Rotate-Only or Push-and-Rotate
or	1305622Q16	ESCUTCHEON, SECURENET, Submersible, No Knob
or	1305622Q17	ESCUTCHEON, SECURENET, Submersible, Push-Only
or	1305622Q15	ESCUTCHEON, SECURENET, Submersible, Rotate-Only or Push-and-Rotate
21	0205916P01	NUT, Spanner (2 req'd)
22	3205082E61	GASKET, O-Ring (part of item 23)
23	RPX4691A	KIT, RF Connector (includes items 22,24)
24	4205852N01	CONTACT, Ground, RF (part of item 23)
25	NLE9610A	ASSEMBLY, UHF Main PC Board
26	NTN4726A	ASSEMBLY, Back Shield (includes item 27)
27	0305706Q01	SCREW, Captive (4 req'd) (part of item 26)
28	4205577Q01	CLIP, Ground
29	1405343S01	BOOT, Oscillator, SABER I
30	RPX4700A	KIT, PTT/Controls Flex (includes item 31)
or	RPX4723A	KIT, PTT/Controls Flex Assembly (includes items 2,3,31)
31	RPX4694A	KIT, Contact Snapdome (S803, 805) (2 req'd) (part of item 30)
32	4505022P02	LEVER, PTT (part of item 30)
33	NTN4592A	BATTERY, 500 mAh

or	NTN4593A	BATTERY, 900 mAh
or	NTN4595A	BATTERY, 1500 mAh
or	NTN4537A	BATTERY, 3600 mAh Primary
or	NTN4538A	BATTERY, FM, 900 mAh
or	NTN4596A	BATTERY, FM, 1500 mAh
34	0305706Q02	SCREW, Baseplate Ph Pan Hd; 2-56x3/32" (4 req'd) (part of item 43)
35	3905453Q01	CONTACT, Power (4 req'd)
36	4205437Q01	RETAINER, Baseplate (part of item 43)
37	RPX4696A	KIT, Slotted Spanner Nut (2 req'd) (part of item 43)
38	6405847N03	BASEPLATE (part of item 43)
39	3205701Q01	SEAL, Elastomer (part of item 43)
40	3205472M01	SEAL, Vacuum Port (part of item 43)
41	5505333Q01	LATCH, Battery (part of item 43)
42	4105775Q01	SPRING, Latch (part of item 43)
43	NHN6400A	ASSEMBLY, Housing, SABER I (includes items 32, 34 thru 42)
or	NHN6398A	ASSEMBLY, Housing, SABER I Submersible (includes items 32, 34 thru 42)
44	3305183R03	LABEL, Bottom Nameplate, SABER I
45	3305183R01	LABEL, Top Nameplate, SABER I
46	1405490Q01	BOOT, Microphone
47	RPX4721A	KIT, Speaker Bracket, SABER I (includes item 48)
48	7505641N03	PAD, Speaker Bracket (part of item 47)
49	0105958M34	ASSEMBLY, Speaker/Microphone Flex, SABER I
50	4205604Q01	RETAINER, Speaker
51	1405182M03	INSULATOR, Universal Connector
52	0705319R02	BRACKET, Switch
53	4005221R02	SWITCH, Dual-Function (S801, 804)
54	3205082E68	GASKET, O-Ring, Emergency (includes item 54)
55	NTN5069A	KIT, Rotate-Only Knob (includes item 54)
or	NTN5068A	KIT, Push-and-Rotate Knob (optional) (includes item 54)
or	NTN5076A	KIT, Push-Only Knob (optional) (includes item 54)
or	4305607S01	PLUG, Seal (optional)
56	NTN4788A	ASSEMBLY, Belt Clip
57	NTN5025A	COVER, Universal Connector

SABER II SECURENET UHF  
Exploded View Parts List

TPLF-3498-O

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	RPX4720A	ASSEMBLY, Frame Stud (includes item 5)
2	RPX4689A	KIT, Frequency Switch (S823) (includes item 4)
3	RPX4690A	KIT, On/Off Switch (S800)/Volume Control (R800) (includes item 4)
4	3205082E62	GASKET, O-Ring (2 req'd) (part of items 2 and 3)
5	3205422Q01	SEAL, Stud (2 req'd) (part of item 1)
6	6105436Q01	LIGHTPIPE, LED
7	3205082E59	GASKET, O-Ring (part of item 10)
8	0305714J09	SCREW, Module, Ph Pan Hd; 2-56x3/8" (7 req'd)
9	0305381L02	SCREW, Top Panel; 2-32 (2 req'd)
10	RPX4693A	KIT, Antenna Bushing (includes item 12)
11	3205082E71	GASKET, O-Ring (part of item 13)
12	3205082E58	GASKET, O-Ring (part of item 10)
13	RPX4692A	KIT, Control Top Panel (includes item 11)
14	0400139731	LOCKWASHER, Internal Tooth
15	0205591R01	NUT, Antenna Bushing
16	0405781Q01	WASHER, Detent (even number of switch positions)
or	0405781Q03	WASHER, Detent (odd number of switch positions)
17	NAE6431A	ANTENNA, UHF Helical (403 - 433 MHz)
or	NAE6432A	ANTENNA, UHF Helical (438 - 470 MHz)
or	NAE6434A	ANTENNA, UHF Helical (470 - 512 MHz)
or	NAE6440A	ANTENNA, UHF Whip (403 - 512 MHz)
18	RPX4699A	KIT, Frequency Knob
19	RPX4698A	KIT, On/Off/Volume Knob
20	1305622Q09	ESCUTCHEON, SECURENET, No Knob
or	1305622Q07	ESCUTCHEON, SECURENET, Push-Only
or	1305622Q03	ESCUTCHEON, SECURENET, Rotate-Only or Push-and-Rotate
21	0205916P01	NUT, Spanner (2 req'd)
22	3205082E61	GASKET, O-Ring (part of item 23)
23	RPX4691A	KIT, RF Connector (includes items 22,24)
24	4205852N01	CONTACT, Ground, RF (part of item 23)
25	NLE9610A	ASSEMBLY, UHF Main PC Board
26	NTN4726A	ASSEMBLY, Back Shield (includes item 27)
27	0305706Q01	SCREW, Captive (4 req'd) (part of item 26)
28	4205577Q01	CLIP, Ground
29	1405387R01	BOOT, Oscillator, SABER II/III
30	RPX4700A	KIT, PTT/Controls Flex (includes item 31)
or	RPX4723A	KIT, PTT/Controls Flex Assembly (includes items 2,3,31)
31	RPX4694A	KIT, Contact Snapdome (S803, 805) (2 req'd) (part of item 30)
32	4505022P02	LEVER, PTT (part of item 30)
33	NTN4592A	BATTERY, 500 mAh
or	NTN4593A	BATTERY, 900 mAh
or	NTN4595A	BATTERY, 1500 mAh
or	NTN4540A	BATTERY, 3600 mAh Primary
or	NTN4537A	BATTERY, FM, 500 mAh
or	NTN4538A	BATTERY, FM, 900 mAh
or	NTN4596A	BATTERY, FM, 1500 mAh
34	0305706Q02	SCREW, Baseplate, Ph Pan Hd; 2-56x3/32" (4 req'd) (part of item 43)
35	3905453Q01	CONTACT, Power (4 req'd) (part of item 43)
36	4205437Q01	RETAINER, Baseplate (part of item 43)
37	RPX4696A	KIT, Slotted Spanner Nut (2 req'd) (part of item 43)
38	6405847N03	BASEPLATE (part of item 43)
39	3205701Q01	SEAL, Elastomer (part of item 43)
40	3205472M01	SEAL, Vacuum Port (part of item 43)
41	5505333Q01	LATCH, Battery (part of item 43)
42	4105775Q01	SPRING, Latch (part of item 43)
43	NHN6404A	ASSEMBLY, Housing, SABER II (includes items 32, 34 thru 42)
44	3305183R02	LABEL, Nameplate, SABER II
45	0105958M24	ASSEMBLY, Speaker/Microphone Flex, SABER II (8k Display)
or	0105958M34	ASSEMBLY, Speaker/Microphone Flex, SABER II (2k Display)
46	1405490Q01	BOOT, Microphone
47	RPX4722A	ASSEMBLY, LCD/Speaker Bracket
48	RPX4703A	KIT, LCD Assembly (part of item 49)

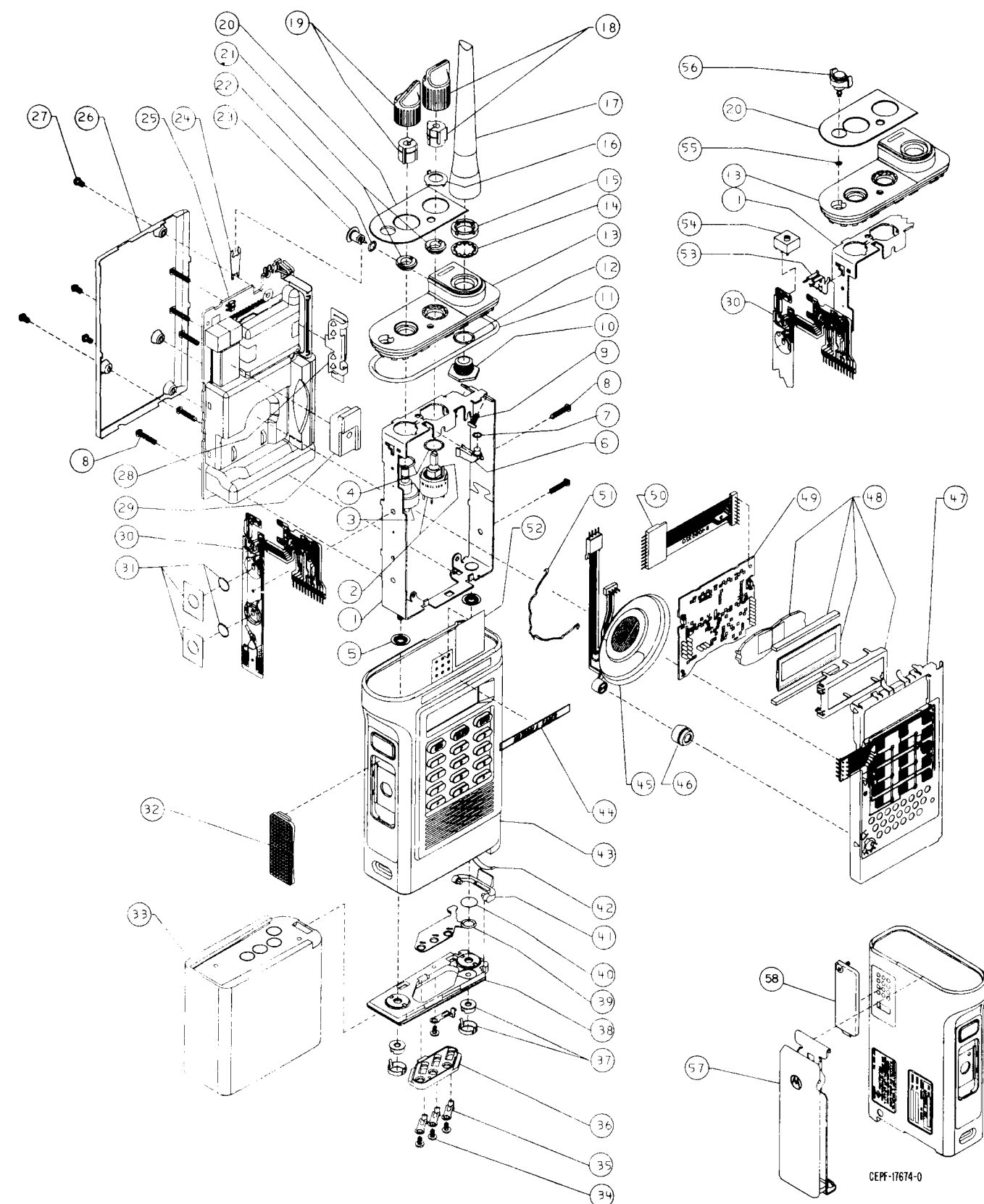
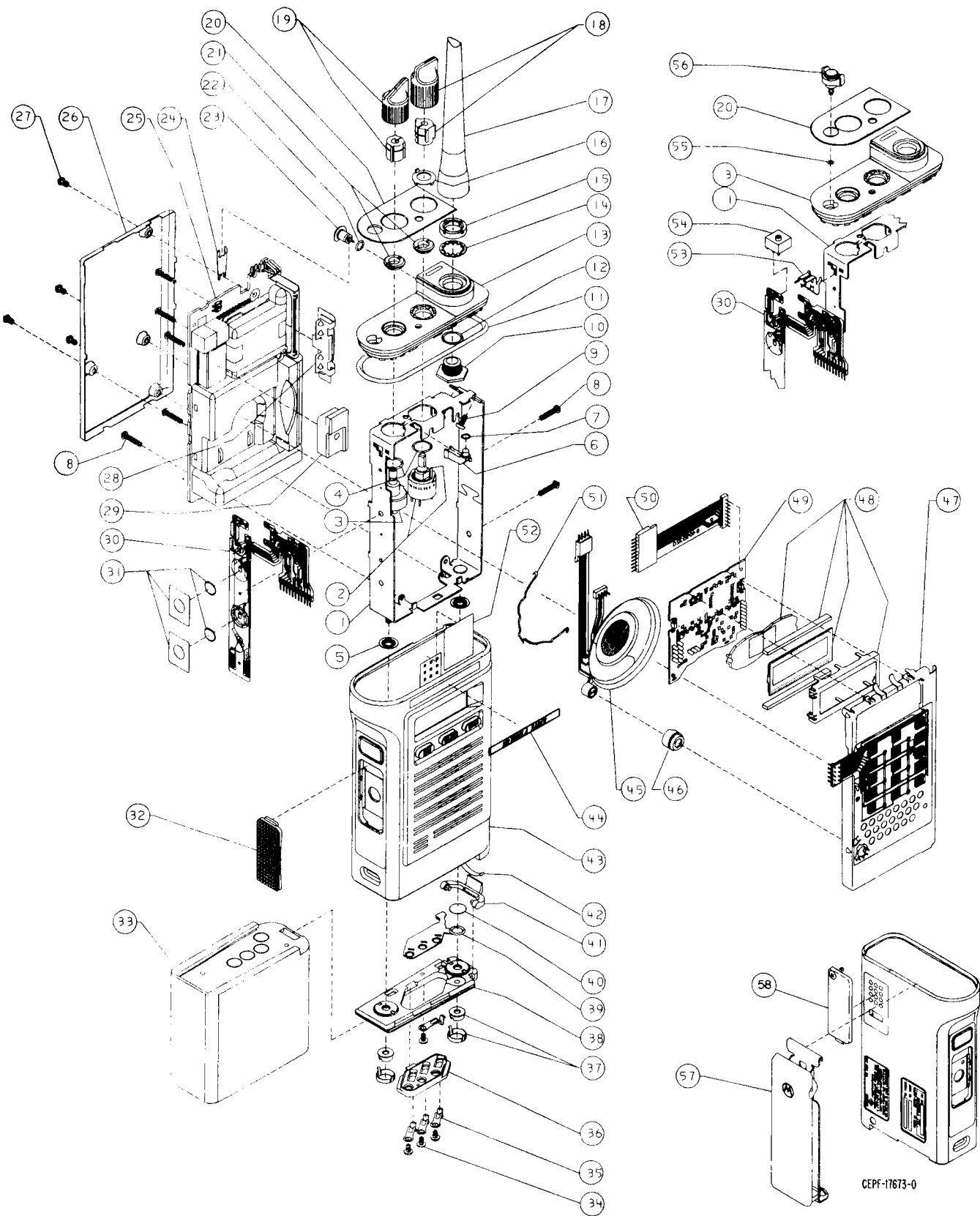
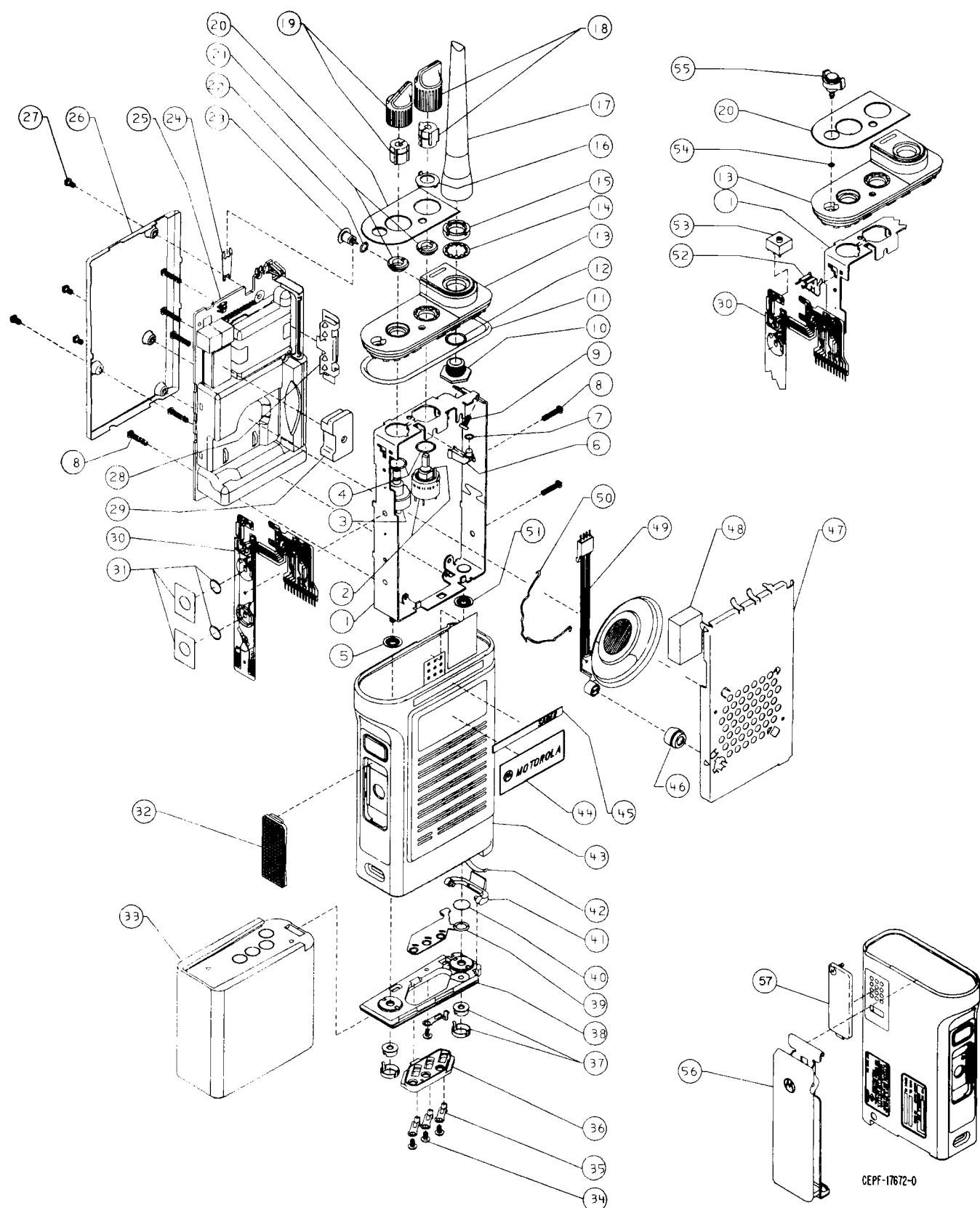
49	8460999A34	ASSEMBLY, 8k Display PC Board, SABER II (includes item 48)
or	8460999A41	ASSEMBLY, 2k Display PC Board, SABER II (includes item 48)
50	8405532Q01	FLEX CIRCUIT, LCD Interconnect
51	4205604Q01	RETAINER, Speaker
52	1405182M03	INSULATOR, Universal Connector
53	0705319R02	BRACKET, Switch
54	4005221R02	SWITCH, Dual-Function (S801, 804)
55	3205082E68	GASKET, O-Ring, Emergency (includes item 54)
56	NTN5069A	KIT, Rotate-Only Knob (includes item 54)
or	NTN5068A	KIT, Push-and-Rotate Knob (optional) (includes item 54)
or	NTN5076A	KIT, Push-Only Knob (optional) (includes item 54)
or	4305607S01	PLUG, Seal (optional)
57	NTN4788A	ASSEMBLY, Belt Clip
58	NTN5025A	COVER, Universal Connector

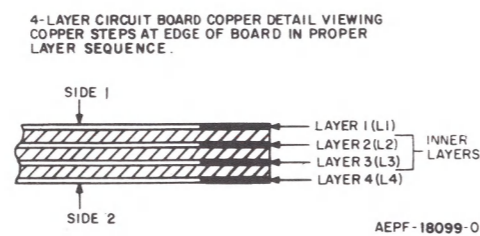
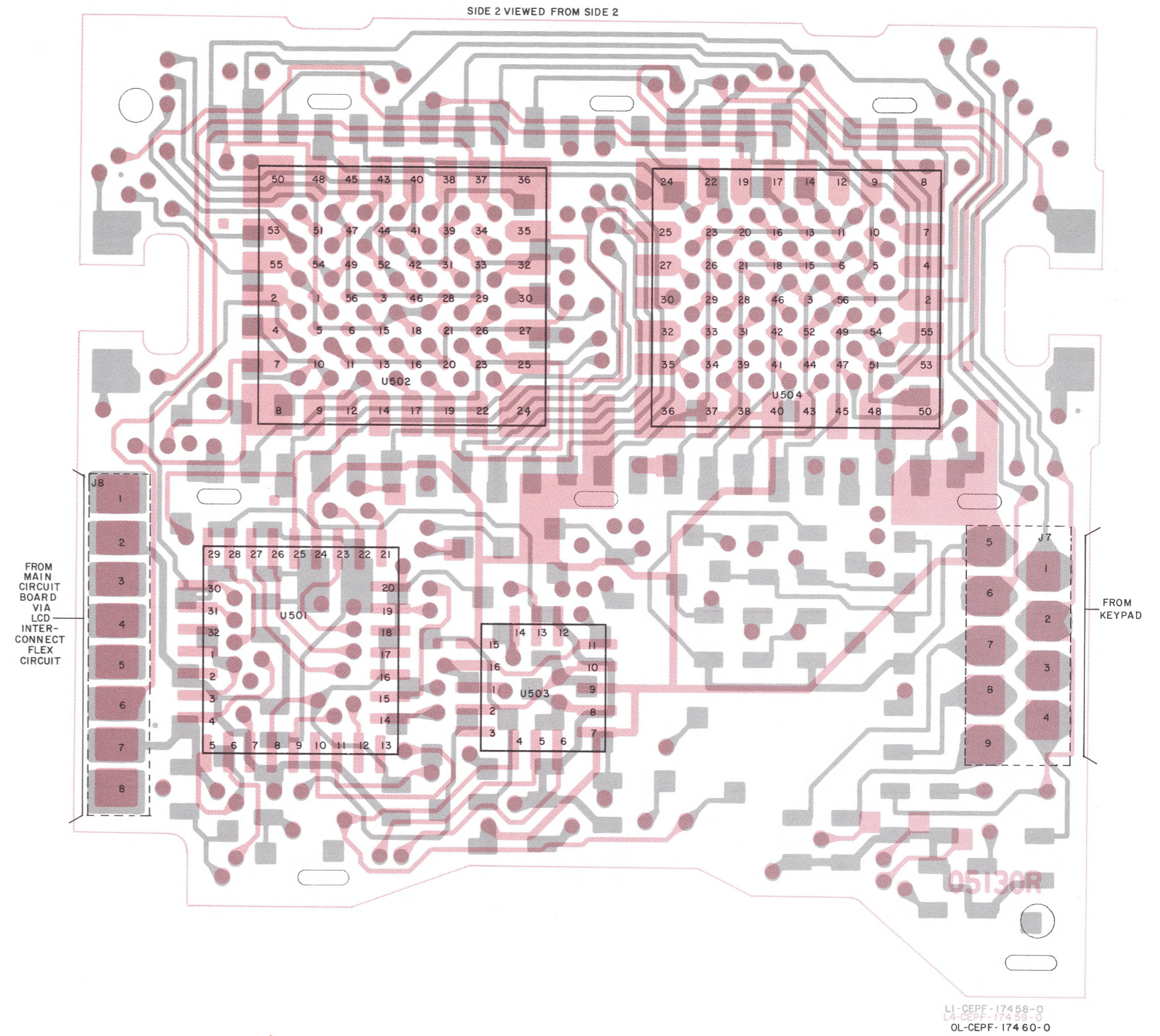
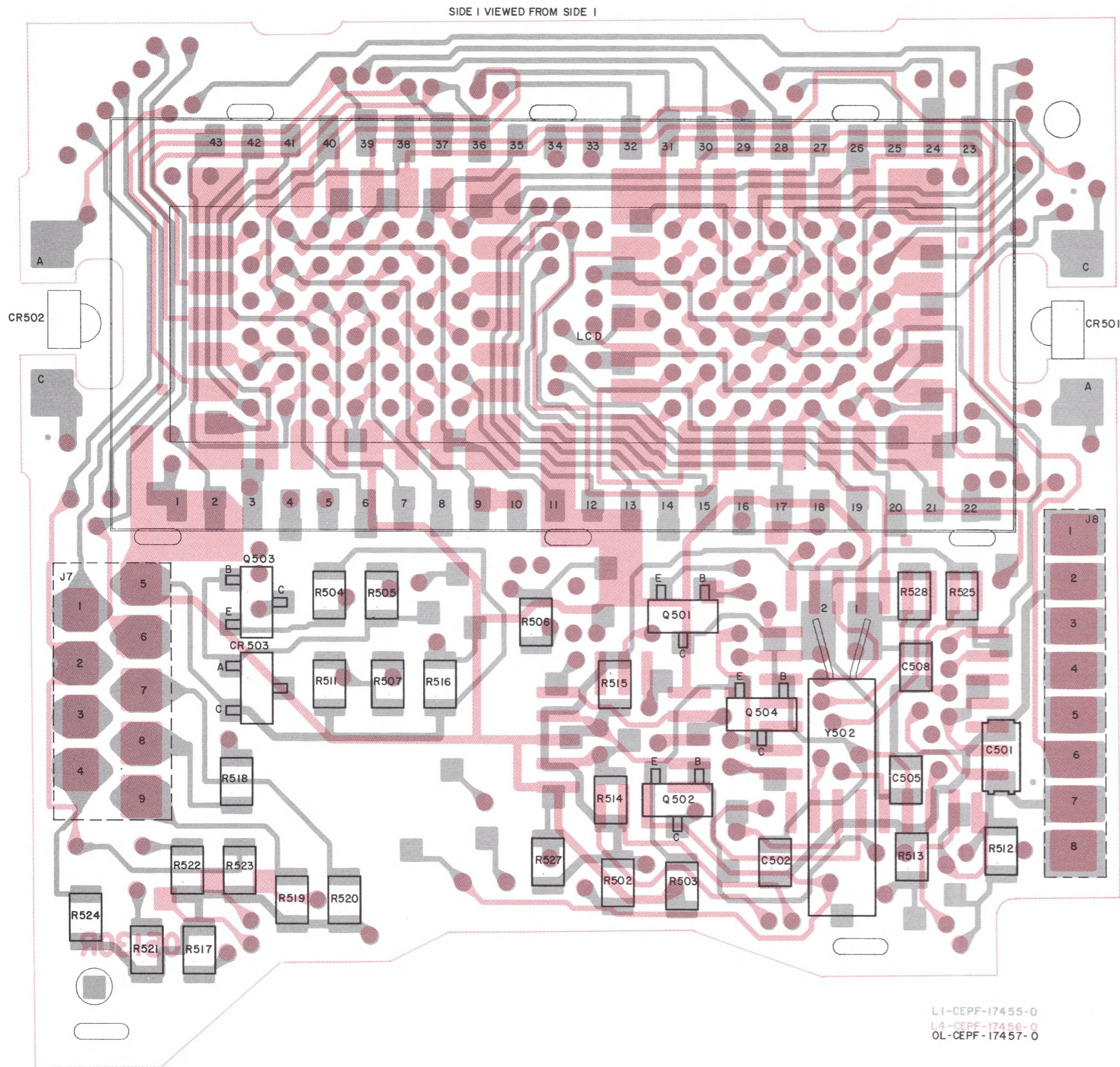
SABER III SECURENET UHF  
Exploded View Parts List

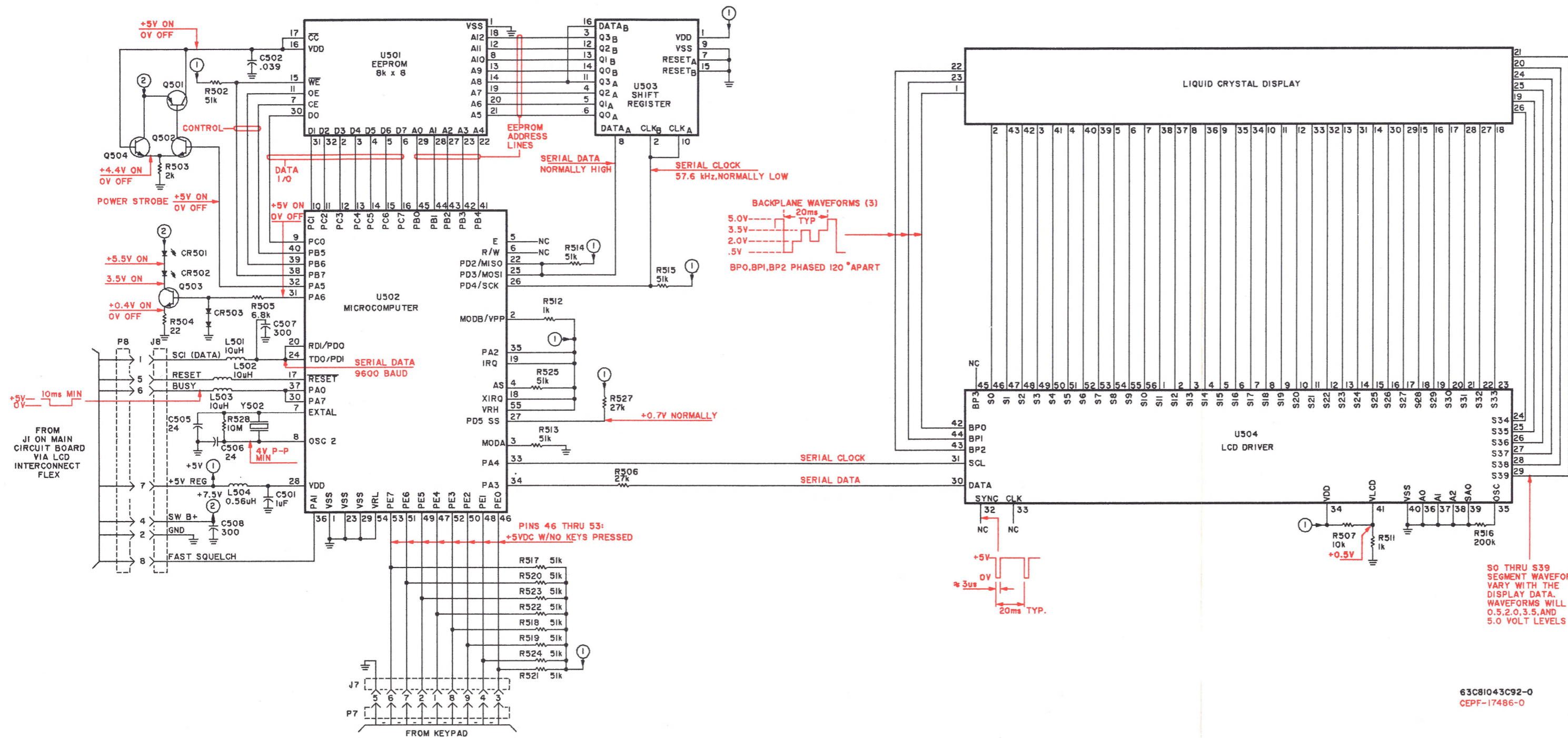
TPLF-3499-O

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	RPX4720A	ASSEMBLY, Frame Stud (includes item 5)
2	RPX4689A	KIT, Frequency Switch (S823) (includes item 4)
3	RPX4690A	KIT, On/Off Switch (S800)/Volume Control (R800) (includes item 4)
4	3205082E62	GASKET, O-Ring (2 req'd) (part of items 2 and 3)
5	3205422Q01	SEAL, Stud (2 req'd) (part of item 1)
6	6105436Q01	LIGHTPIPE, LED
7	3205082E59	GASKET, O-Ring
8	0305714J09	SCREW, Module, Ph Pan Hd; 2-56x3/8" (7 req'd)
9	0305381L02	SCREW, Top Panel; 2-32 (2 req'd)
10	RPX4693A	KIT, Antenna Bushing (includes item 12)
11	3205082E71	GASKET, O-Ring (part of item 13)
12	3205082E58	GASKET, O-Ring (part of item 10)
13	RPX4692A	KIT, Control Top Panel (includes item 11)
14	0400139731	LOCKWASHER, Internal Tooth
15	0205591R01	NUT, Antenna Bushing
16	0405781Q01	WASHER, Detent (even number of switch positions)
or	0405781Q03	WASHER, Detent (odd number of switch positions)
17	NAE6431A	ANTENNA, UHF Helical (403 - 433 MHz)
or	NAE6432A	ANTENNA, UHF Helical (438 - 470 MHz)
or	NAE6434A	ANTENNA, UHF Helical (470 - 512 MHz)
or	NAE6440A	ANTENNA, UHF Whip (403 - 512 MHz)
18	RPX4699A	KIT, Frequency Knob
19	RPX4698A	KIT, On/Off/Volume Knob
20	1305622Q09	ESCUTCHEON, SECURENET, No Knob
or	1305622Q07	ESCUTCHEON, SECURENET, Push-Only
or	1305622Q03	ESCUTCHEON, SECURENET, Rotate-Only or Push-and-Rotate
21	0205916P01	NUT, Spanner (2 req'd)
22	3205082E61	GASKET, O-Ring (part of item 23)
23	RPX4691A	KIT, RF Connector (includes items 22,24)
24	4205852N01	CONTACT, Ground, RF (part of item 23)
25	NLE9610A	ASSEMBLY, UHF Main PC Board
26	NTN4726A	ASSEMBLY, Back Shield (includes item 27)
27	0305706Q01	SCREW, Captive (4 req'd) (part of item 26)
28	4205577Q01	CLIP, Ground
29	1405387R01	BOOT, Oscillator, SABER III/III
30	RPX4700A	KIT, PTT/Controls Flex (includes item 31)
or	RPX4723A	KIT, PTT/Controls Flex Assembly (includes items 2,3,31)
31	RPX4694A	KIT, Contact Snapdome (S803, 805) (2 req'd) (part of item 30)
32	4505022P02	LEVER, PTT (part of item 30)
33	NTN4592A	BATTERY, 500 mAh
or	NTN4593A	BATTERY, 900 mAh
or	NTN4595A	BATTERY, 1500 mAh
or	NTN4540A	BATTERY, 3600 mAh Primary
or	NTN4537A	BATTERY, FM, 500 mAh
or	NTN4538A	BATTERY, FM, 900 mAh
or	NTN4596A	BATTERY, FM, 1500 mAh
34	0305706Q02	SCREW, Baseplate, Ph Pan Hd; 2-56x3/32" (4 req'd) (part of item 43)
35	3905453Q01	CONTACT, Power (4 req'd) (part of item 43)
36	4205437Q01	RETAINER, Baseplate (part of item 43)
37	RPX4696A	KIT, Slotted Spanner Nut (2 req'd) (part of item 43)
38	6405847N03	BASEPLATE (part of item 43)
39	3205701Q01	SEAL, Elastomer (part of item 43)
40	3205472M01	SEAL, Vacuum Port (part of item 43)
41	5505333Q01	LATCH, Battery (part of item 43)
42	4105775Q01	SPRING, Latch (part of item 43)
43	NHN6402A	ASSEMBLY, Housing, SABER III (includes items 32, 34 thru 42)
44	3305183R02	LABEL, Nameplate, SABER III

45	0105958M24	ASSEMBLY, Speaker/Microphone Flex, SABER III
46	1405490Q01	BOOT, Microphone
47	RPX4722A	ASSEMBLY, LCD/Speaker Bracket
48	RPX4703A	KIT, LCD Assembly (part of item 49)
49	8460999A34	ASSEMBLY, Display PC Board, SABER III (includes item 48)
50	8405532Q01	FLEX CIRCUIT, LCD Interconnect
51	4205604Q01	RETAINER, Speaker
52	1405182M03	INSULATOR, Universal Connector
53	0705319R02	BRACKET, Switch
54	4005221R02	SWITCH, Dual-Function (S801, 804)
55	3205082E68	GASKET, O-Ring, Emergency (includes item 54)
56	NTN5069A	KIT, Rotate-Only Knob (includes item 54)
or	NTN5068A	KIT, Push-and-Rotate Knob (optional) (includes item 54)
or	NTN5076A	KIT, Push-Only Knob (optional) (includes item 54)
or	4305607S01	PLUG, Seal (optional)
57	NTN4788A	ASSEMBLY, Belt Clip
58	NTN5025A	COVER, Universal Connector







SABER 2k Display  
Electrical Parts List

TPLF-3406-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C501 C502 C503, 504 C505, 506	2362998B59 2160521C32 ----- 2160520B10	CAPACITOR, Fixed: pF±5%; 50V unless stated 1uF±10%; 20V .039uF±10%; 25V Not Used 24
CR501, 502 CR503	4805729G27 4805129M06	DIODE: See Note I LED, Yellow Dual; SOT-23
Q501 Q502 thru 504	4805128M29 4805128M12	TRANSISTOR: See Note I PNP; BCX18 (LH) NPN; BCW60B (RH)
R501 R502 R503 R504 R505 R506 R507 R508 thru 510 R511, 512 R513 thru 515 R516 R517 thru 525 R526 R527 R528	----- 0660076A90 0660076A56 0660076A09 0660076A69 0660076A83 0660076A73 ----- 0660076A49 0660076A90 0660076F08 0660076A90 ----- 0660076A83 0660076H49	RESISTOR, Fixed: Ω±5%; 1/8W unless stated Not Used 51k 2k 22 6.8k 27k 10k Not Used 1k 51k 200k±1% 51k Not Used 27k 10M±10%
U501 U502 U503 U504	5105165R22 0105953N07 0105953N09 0105953N10	CIRCUIT MODULE: See Note I EEPROM; 2k x 8 Microcomputer, HCMOS Shift Register, CMOS LCD Driver
Y501 Y502	----- 4805664G39	CRYSTAL: Not Used 3.6864MHz
NONREFERENCED ITEMS		
	NTN5421A	PAD, Shock

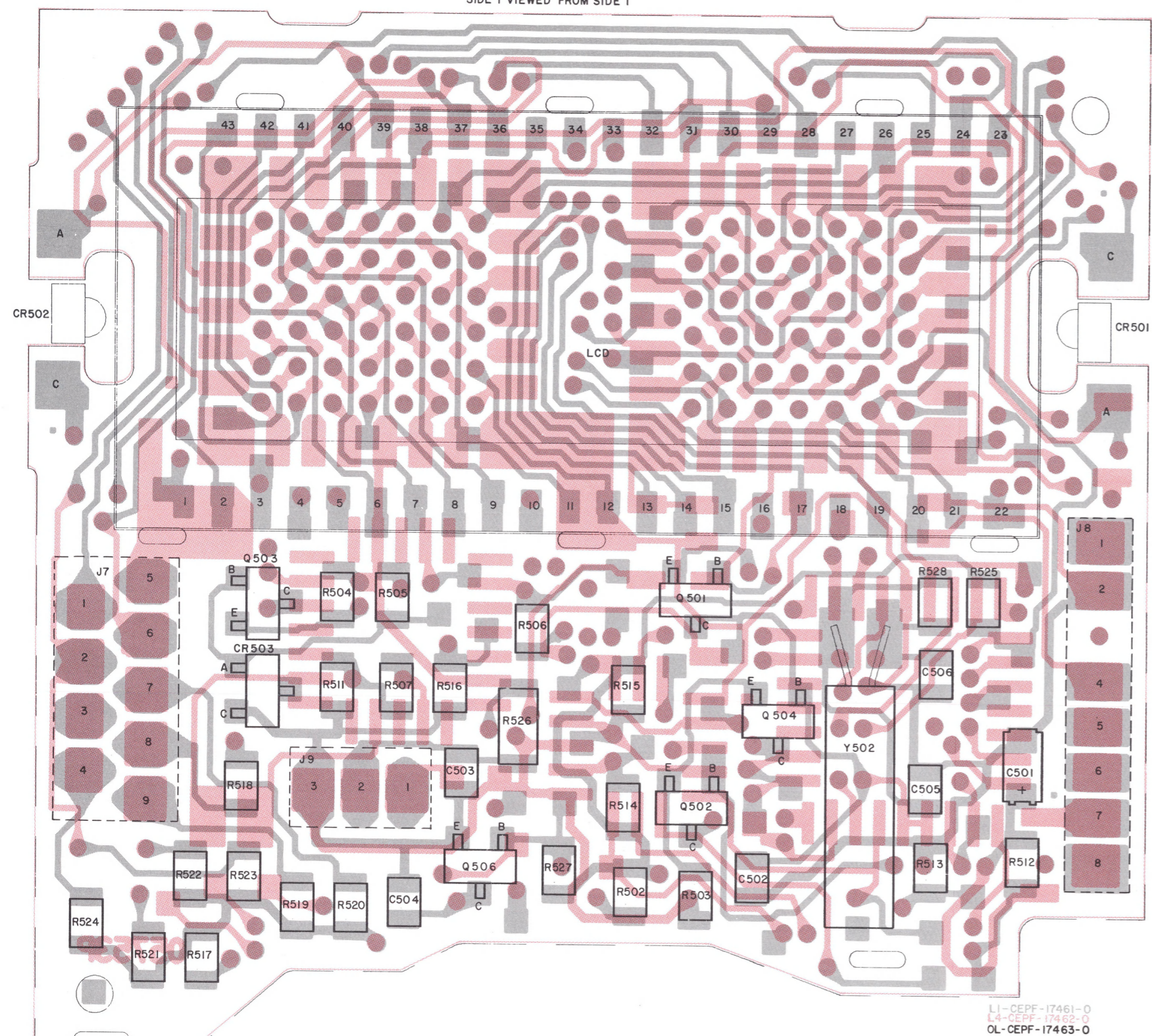
NOTES:  
I. For optimum performance, order replacement diodes, transistors, and circuit modules by Motorola part number only.

SCHEMATIC AND CIRCUIT BOARD NOTES

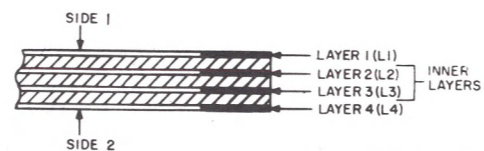
1. Unless otherwise stated, resistances are in ohms (k = 1000), capacitances less than 1 are in microfarads, and capacitances 1 or greater are in picofarads.

TEPF-17445-O

SIDE 1 VIEWED FROM SIDE 1

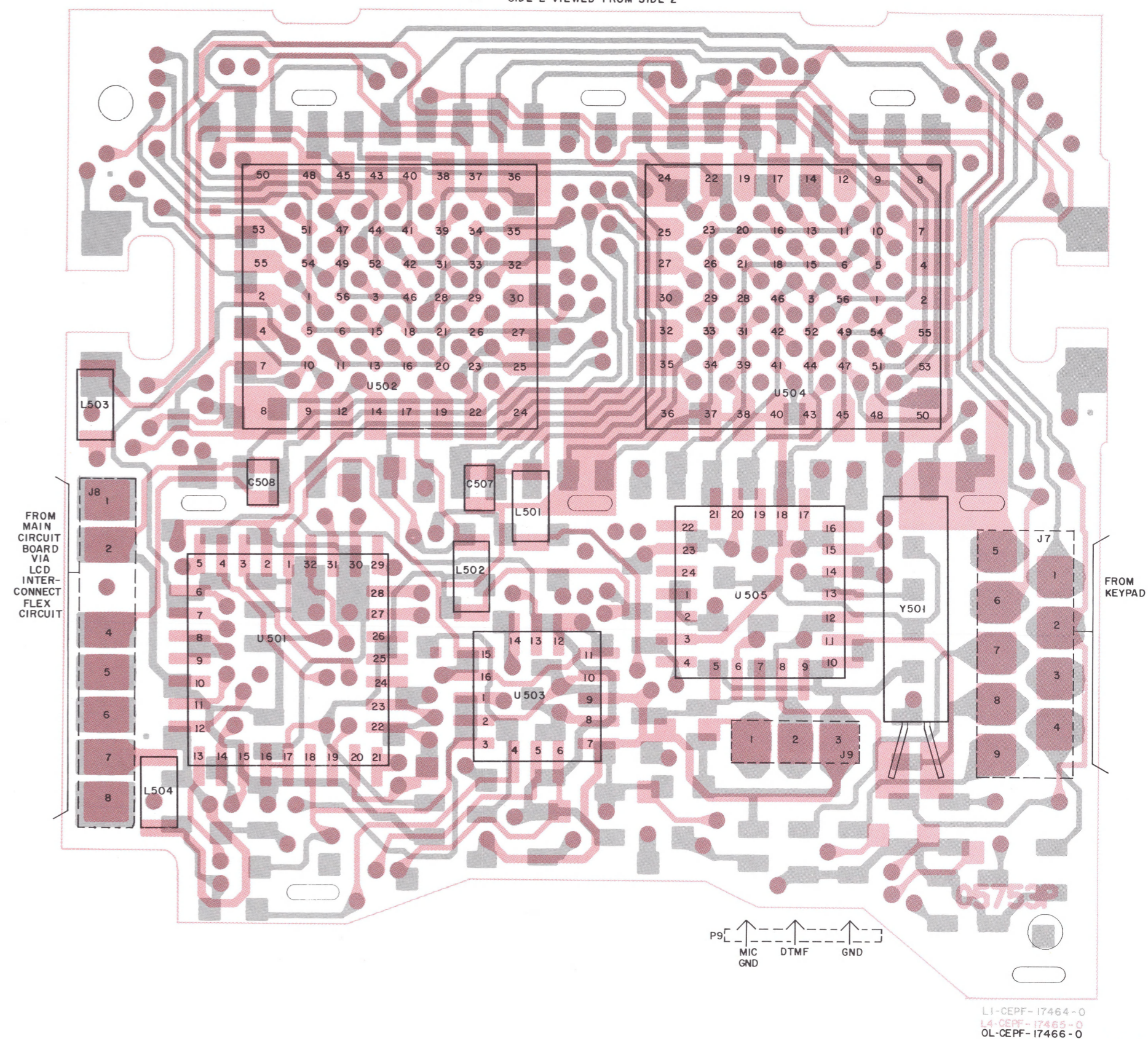


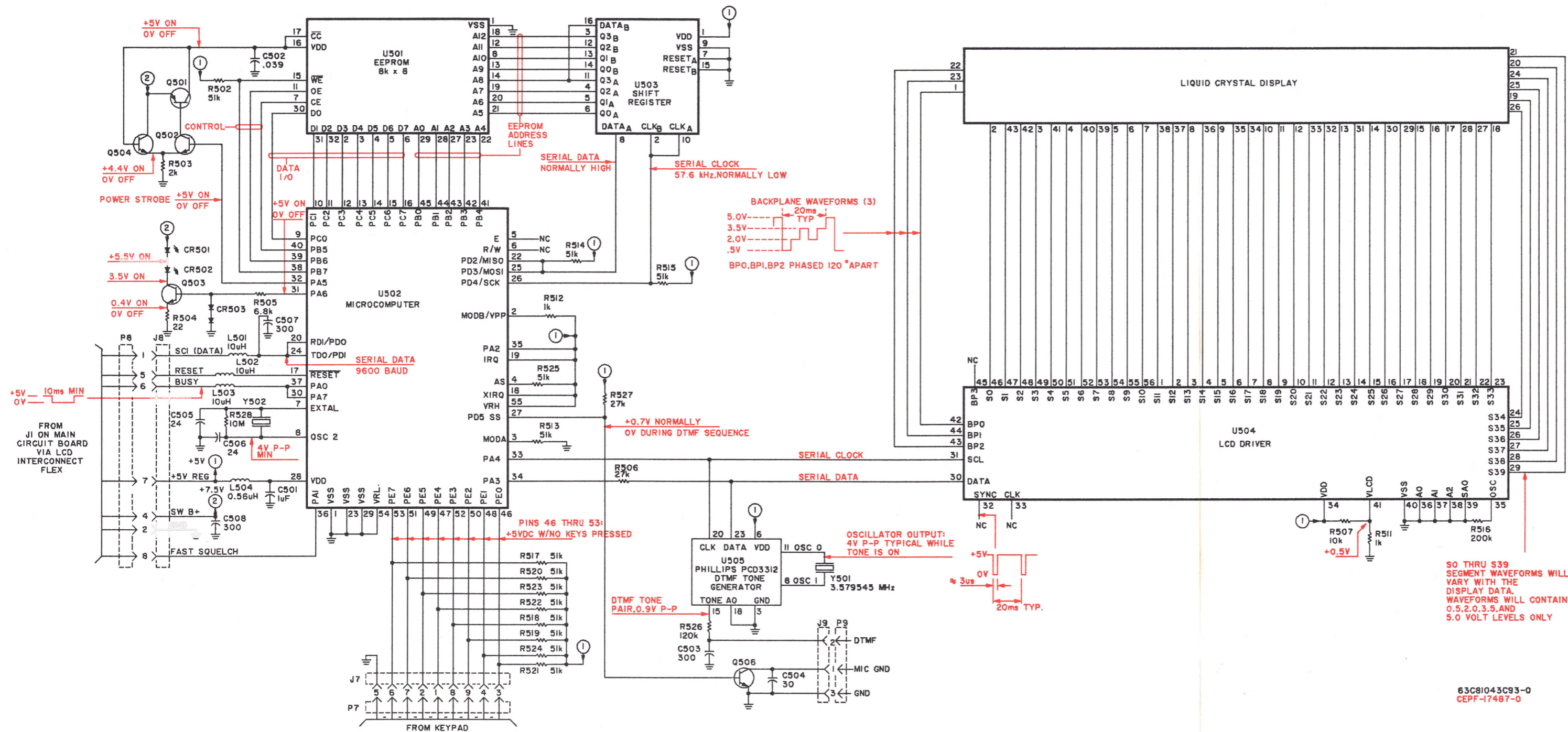
4-LAYER CIRCUIT BOARD COPPER DETAIL VIEWING  
COPPER STEPS AT EDGE OF BOARD IN PROPER  
LAYER SEQUENCE.



AEPF-18099-0

SIDE 2 VIEWED FROM SIDE 2





REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C501 C502 C503 C504 C505, 506	2362998B59 2160521C32 2160520C12 2160520B12 2160520B10	<b>CAPACITOR, Fixed: pF±5%; 50V</b> unless stated 1uF±10%; 20V .039uF±10%; 25V 300 30 24
CR501, 502 CR503	4805729G27 4805129M06	<b>DIODE:</b> See Note 1 LED, Yellow Dual; SOT-23
Q501 Q502 thru 504 Q505 Q506	4805128M29 4805128M12 ----- 4805128M12	<b>TRANSISTOR:</b> See Note 1 PNP; BCX18 (LH) NPN; BCW60B (RH) Not Used NPN; BCW60B (RH)
R501 R502 R503 R504 R505 R506 R507 R508 thru 510 R511, 512 R513 thru 515 R516 R517 thru 525 R526 R527 R528	----- 0660076A90 0660076A56 0660076A09 0660076A69 0660076A83 0660076A73 ----- 0660076A49 0660076A90 0660076F08 0660076A90 0611024A99 0660076A83 0660076H49	<b>RESISTOR, Fixed: Ω±5%; 1/8W</b> unless stated Not Used 51k 2k 22 6.8k 27k 10k Not Used 1k 51k 200k±1% 51k 120k 27k 10M±10%
U501 U502 U503 U504 U505	0105953N12 0105953N07 0105953N09 0105953N10 0105953N18	<b>CIRCUIT MODULE:</b> See Note 1 EEPROM; 8k x 8 Microcomputer, HCMOS Shift Register, CMOS LCD Driver Tone Encoder
Y501 Y502	4805664G40 4805664G39	<b>CRYSTAL:</b> 3.579545MHz 3.6864MHz
<b>NONREFERENCED ITEMS</b>		
	NTN5421A	PAD, Shock

**NOTES:**  
1. For optimum performance, order replacement diodes, transistors, and circuit modules by Motorola part number only.

**SCHEMATIC AND CIRCUIT BOARD NOTES**

- Unless otherwise stated, resistances are in ohms (k = 1000), capacitances less than 1 are in microfarads, and capacitances 1 or greater are in picofarads.

TEPF-17445-O

